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A New Year's Resolution for the American People: That we will, from this time forth, administer the forests and other natural resources of the country as a trust, consuming only the income and preserving the principal unimpaired, that the greatness and prosperity of the nation may not perish as long as the flag floats over it and coming generations may still know the phrase

A Happy New Year



LESSONS FROM THE FOREST

REPRODUCTION BY SEEDING—AN INTERESTING BOTANICAL STUDY

American Forestry

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LESSONS FROM THE FOREST

BY EDWIN R. JACKSON.

UNITED STATES FOREST SERVICE.

(This was delivered in substantially its present form as an address before the Iowa State Teachers' Association at Des Moines, November 3, 1910.)

I HAVE desired, in preparing this paper, to help a little in solving the problem of how to make the every-day work of the school interesting and profitable. If I fail to do so, it will be because of lack of ability to make you see from my viewpoint; not because my heart isn't right. I would like to begin immediately to point out some of the interesting things which the forest offers in the way of "teacher's helps," but in order to make myself and my purpose clear, I find that a few words of explanation are necessary, so at the risk of being pedantic, I must take time for a short introduction.

You have all doubtless been reminded many times of that rather vague but very comprehensive statement of Herbert Spencer, that "Education is the preparation for complete living." We frequently misquote this, or at least misinterpret it, and tell our pupils that they must go to school in order to "prepare for life!" How many school boys do you suppose have heard this statement from parent or teacher and secretly resolved to cut out the preparation and get into the real thing as soon as possible? We make the school appear not as a very necessary part of life, but as a sort of purgatory which precedes that blessed state. Do you blame the boy for wanting to shorten his stay there? Then we have the audacity to tell him that school days are the happiest days of *life*. What hypocrites our children must sometimes think us! Let us first get on solid ground and teach that school work is as much the business of life as selling goods, and that education is acquainting ourselves with the field of our labors, quite as much as the first trip of the new salesman over his route or the apprenticeship of the tradesman.

Assuming this to be true, we must at once conclude that familiarity with one's environment is essential to success in life. By success, I mean not so much ability to outstrip one's competitors as the ability to serve one's fellow-men; to meet each situation which arises, with confidence; and to live happily and in content.

I observed a curious incident recently in one of the magnificent hotels of an eastern city. Two men entered the building at about the same time. One was tall, broad-shouldered and powerfully built. His tanned features and calloused hands showed that he was accustomed to hard work, and his muscles

as strong as steel; yet he approached the clerk's desk with every sign of timidity and even fear. There followed close on his heels a dapper little, undersized, sallow-faced person, loose-muscled and physically insignificant—yet he walked forward with the utmost self-confidence and ease of bearing. The big man could easily have broken the little fellow in two, if it had come to a test of physical strength between them, but he allowed himself to be elbowed aside without a word of protest, and shrank back timidly while the clerk turned to the desk and greeted the more aggressive late comer first. What is the explanation of the conduct of these two men? Simply that the big man did not feel sure of himself; he was in surroundings which were unfamiliar to him, while the little man was wholly at home. It is the same instinct which makes the country dog which has followed his master to town, turn tail from his city cousin until he reaches the shelter of the master's wagon, when he faces his pursuer and stands at bay.

The lesson I wish to draw from these illustrations is this: A serious part of the work of the teacher is to acquaint the pupil with his environment; to make him master of the natural phenomena with which he is surrounded, so that he need not be at loss to know how to make them serve him. Since the Almighty placed our common ancestor, Adam, on this world with the command to take the earth and subdue it, man has striven to learn the secrets of Nature and to use the resources of earth, sea, and air for his own comfort and support. In part, he has been successful, yet how many of us, if cast away like another Robinson Crusoe, could hold our own in the struggle for existence? How many of us, when walking in the fields, hesitate to pluck the brilliant flower which blooms in our path, or to taste the tempting berries which the bushes hold forth to us, for fear they may be poisonous? The lesson is obvious. To paraphrase an old proverb—it is this: "Familiarity breeds confidence."

No one can be wholly successful in life who is the victim of discontent. I mean by this not the kind of discontent which sees in society conditions which are unjust and seeks to right them; this is the kind of discontent that is productive of "insurgents." I mean rather the discontent that sees no beauty in the fairest landscape, but only trees and bushes; that hears no music in the singing of the birds, but only shrill noise. There are people who live amid scenes of the greatest beauty yet who wonder why tourists come to look on the rocks and hills with which they are surrounded. I have been told of people who have lived for years within sight of the Congressional Library in Washington—that building which is said to have the most beautifully decorated interior of any building in the United States—yet who have never entered its portals. These same people doubtless complain because they cannot afford to take a trip to New York or Paris to see the sights. Here, then, is another part of the work of the educator—to teach an appreciation of one's immediate environment, and to stir up an interest in Nature's phenomena with which every one is surrounded, so that no matter where one finds himself, there is always something to entertain and instruct him. The ideal is that of Him who found "Sermons in stones and books in the running brooks."

THE PLACE OF FORESTRY IN PUBLIC SCHOOL EDUCATION.

You will readily perceive from what I have said why I have the temerity to suggest forestry as a subject for study in the public schools. Forestry is in no sense to be considered an unwelcome intruder begging to be admitted to the select company now comprising the public school curriculum. The guest chamber is already over-crowded, and there is no room for additional occupants in the places of honor. Forestry asks nothing more than admission to the servant's quarters. It desires only to serve, and in the role of a good

servant, is glad to efface itself and lose its identity in order that its superiors may appear to better advantage and thus become more attractive. It seeks not to *supplant* but to *supplement*.

While forestry furnishes material which is of the utmost value as supplementing many subjects, such, for example, as geography, history, botany, and civics, its special place is clearly as a part of nature study and agriculture. In the primary grades, the cultural qualities and the element of scientific observation which enter into the study of forest conditions are of great value in training young children to think clearly and observe accurately. In the upper grades and the high school, forestry again appears, this time as a very vital part of agriculture. The woodlot is coming more and more to be recognized as an essential part of every well-organized farm, and the products of the woodlot to be considered as one of the important farm crops on the same basis with wheat and corn. From an economic standpoint, the lessons of the woodlot are too significant to be omitted. May I suggest that any text-book on agriculture which does not include a chapter on the woodlot is, to that extent, incomplete.

Now let us consider for a moment the advantages of the forest as a source of illustrative material. The study of trees is quite common in the public schools, but some times we see so many trees that we lose sight of the forest. The forest should be studied as such to be of the greatest interest. It is rich with interesting examples of the phenomena of plant and animal life. It is as though the Book of Nature were here issued in folio sized edition, printed in long primer type, for everything is built on a life-sized scale in the forest, so that he that runs may read. The teacher of botany or geography who is content to point out the pictures in the text-book, yet never takes the pupil outdoors to see the real thing depicted by the picture, deprives the pupil of a great opportunity which lies just over the brow of the hill.

In this fact, that except in a very few localities, the forest does literally lie just over the brow of the hill, lies one great advantage of forestry as a supplemental part of school work. There are few regions of the United States in which some forest features are not close at hand to be studied. Where there is no group of trees that could be dignified with the name of forest, there is at least the tree to study individually. Even in the most crowded city, there are parks to be visited, and I am glad to note the increasing tendency to at least simulate natural forest conditions in these parks and to break away from the stiff artificiality which has been characteristic of city squares and parks hitherto. Even the treeless regions of the western plains furnish ground for the solution of one great problem of the forest—that of afforestation, or tree planting with a view to producing forests.

Again, the teacher who wishes to study the forest, or to make use of the illustrative material which it furnishes, need not wait upon the seasons—the forest is always ready to be studied; it is never out of season. The tree, unlike the flowers or vegetables studied in school gardens and otherwise, does not disappear during the winter. On the contrary, a great many of the most interesting phases of tree life and forest conditions can be studied best in the winter, just at the season when most other forms of plant life are unavailable. This applies especially to the winter buds and protective coverings of the trees, their forms and branchings.

But the forest does not rest its claims for recognition as a candidate for educational consideration upon its botanic importance alone. It also begs to present itself as worthy of consideration from an economic standpoint. The products of the forest enter largely into the commercial life of the nation. Everywhere, despite the disastrous experience of Mother Eve, the fruit of the tree is being constantly partaken of by the sons of men. A thousand articles of

commerce, raw and manufactured, are daily the basis of trade in our markets and affect our lives at every turn. This is too important to be overlooked if the school is to teach what is going on in the world. No teacher of commercial geography, history, or arithmetic can avoid the consideration of problems and questions which deal with the forest and its products. Then, aside from the articles of commerce produced, the forests are coming more and more to be recognized as having an important influence upon the economic development of the country through the influences they exert upon climatic conditions, soils, and water supplies.

In view of all these facts, it seems to me well worth while for the teacher who wishes to make the work of the class room at once broadly instructive, entertaining, and uplifting, to draw freely upon the forest for material to illustrate and intensify the studies of the school.

FORESTRY IN NATURE STUDY.

The tree has long been a favorite subject for nature study. It has so many points of interest, so many phases in its yearly life and is so constantly and universally available that it is invariably drawn upon by teachers looking for illustrative material. Each tree seems to have its own particular effect upon our feelings. The oak, for example, impresses us with its strength, the elm with its grace, the weeping willow with a sense of humility or sorrow.

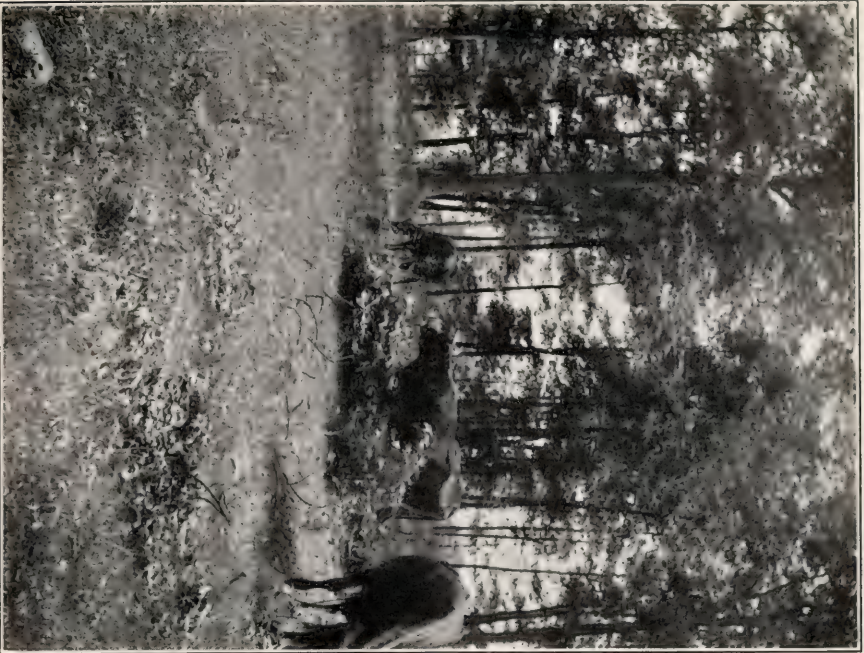
We find a new cause of interest in the tree as the seasons change and with the coming of winter the leaves fall away, leaving the branches bare. Winter affords the best opportunity to study tree forms. An old chestnut or elm, for example, will show plainly the deliquescent or dissolving type of branching, while the poplar or cedar are types of the excurrent form.

The student of nature study will want to know how the tree grows, and an interesting experiment is to dig and wash away the soil from the roots of a small seedling and learn by actual measurement how far the roots extend. Then occasionally in the forest we may find a large tree uprooted by the wind and see how the roots penetrate and hold the soil. No better evidence can be had as to the value of trees in preventing erosion.

Considering the parts of the tree found above ground, we may compare the erect and self-supporting trunk to the stems of vines and herbs. When we study the growth of the tree, no more striking evidence of this growth can be found than the fresh shoots of the evergreen's branches as they appear in the spring.

Now let us leave the study of the individual tree and consider the forest. Here we find not only trees to study but whole colonies of smaller plants and of animals which go to make up the life of the woodland, and there are also for consideration a great many conditions of soil and water supply that depend upon the forest. We need to observe, for example, how the forest floor is interwoven with roots and enriched by the humus of vegetable decay. This can be easily seen in some place where the forest floor extends to the edge of a bank and is thus shown in vertical section.

One of the most important lessons we may learn from the forest is the appreciation of beauty, not only of form but of color. No where can we find such rich and delicate colorings, such a variety of tints and such a procession of changes as our common hardwood forests produce with the changes of the seasons. When the season is mild and Jack Frost does not spoil the show, the autumn leaves set forth for our enjoyment a perfect symphony of color not excelled anywhere in nature. Even stern winter entering upon the stage cannot entirely quell the joyous riot, for the sturdy conifers in their coats of green stand erect amid the snows and continue to play their parts unmindful of the sharpest cold.



UTILIZING THE WOODLOT FOR GRAZING
PURPOSES PREVENTS REPRODUCTION



LESSONS FROM THE FOREST

"WINTER AFFORDS THE BEST OPPORTUNITY
TO STUDY TREE FORMS"



THE SQUIRREL IN HIS TRAVELS
THROUGH THE TREE TOPS



LESSONS FROM THE FOREST

"THE STURDY EVERGREENS STAND ERECT
AGAINST THE SNOWS."



"A LARGE TREE UPROOTED BY THE WIND SHOWS HOW
THE ROOTS PENETRATE AND HOLD THE SOIL."



LESSONS FROM THE FORESTS

A COMMON TYPE OF WOODLOT—THE WINDBREAK



THE WOODLOT HAS ITS PLACE ON THE FARM,
AS WELL AS THE GRAIN FIELD



LESSONS FROM THE FOREST

"THE STUDENT OF GEOGRAPHY SHOULD KNOW OF THE EXTENT
OF THE TREELESS REGIONS OF THE MIDDLE WEST"

It would be both unfortunate and unwise to study the forest without also studying some of the fascinating creatures that inhabit the wildwood. We may watch the squirrel in his travel through the tree tops; the woodpecker, rapping as it were, for admission on the wooden door of the tree trunks or boring holes in the bark as a cache for his winter supply of acorns. We may, if we are bold enough, even venture into the realms of those larger and more ferocious creatures of the woods, such as the bear and wolves. All these go to make the story of the forest one of intense interest to the child.

Before I leave the subject of nature study, I wish to emphasize again the importance of the tree from an aesthetic viewpoint. I need only to remind you of the beauty of a city street lined with beautiful trees to impress upon your minds what you already know—namely, the importance of trees in the beautification of cities. And what can possibly plead more strongly for the cause of the tree than the contrast so often seen of two school houses, situated within a few miles of one another, the first with grounds absolutely barren and uninviting; the other nestling cozily among shady maples, which shelter it in winter from the storms and furnish cool shade in summer?

FORESTRY IN AGRICULTURE.

Possibly the most important phase of the study of forestry in so far as it is applicable to the public school is found in its application to elementary agriculture. We are coming more and more to realize that the woodlot is just as essential to the organization of the farm as the cornfield or the alfalfa patch; the products of the woodlot are just as much to be considered farm crops as grain or hay. Some farms are fortunate enough to include native timberland, but in the prairie states, more often, a plantation is necessary. The difficulty to be overcome in establishing a woodlot is that agricultural land can be made more immediately profitable for the production of other crops than if planted to trees. The student of agriculture will at once see that one function of the woodlot is in the utilization of waste lands, such, for example, as are subject to erosion or cut off from cultivation by streams or other topographical obstructions. It is well to realize also that trees will almost invariably grow on soil too poor or too rough to support any other crop. This is true also of sandy soils, where trees will not only thrive, if proper species are selected, but will also prove useful in preventing the shifting of sands by the action of winds.

Perhaps the most common as well as the most useful type of woodlot plantation found in the Middle West is that which surrounds the home of nearly every prairie farmer. This type combines the advantages of the wind-break or shelterbelt, to that of the crop-producing woodlot. Its advantages are so obvious that argument is really unnecessary to convince any student of agriculture of its importance to the farmer.

Study for a moment the utilization of trees as a protection for the orchard. This is especially important in those regions where there are prevailing winds which will invariably distort and injure the fruit trees if they are unprotected. But the woodlot cannot be left to itself without cultivation or care if it is to be successful. The first thing, of course, to be considered in establishing a plantation is proper planting methods. One common fault in tree planting for woodlot purposes is that often too much space is left between the trees. A plantation will not thrive when the trees are too wide apart to afford mutual protection, while a plantation closely planted will usually produce the best type of tree for posts, poles or lumber because of the clear straight boles which the trees develop.

It is the custom in many places to utilize the woodlot for grazing purposes. This gives bad results in two ways. It prevents any possibility of

reproduction; and the trees are subject to injury by having the earth trampled away, exposing their roots and thus interfering with their growth. If the trees are young, it is the height of folly to allow cattle to graze among them, for the tops will be eaten back and the trees become twisted and broken from the rubbing and trampling they will receive. This fact is witnessed by the ruins of many a school ground plantation.

The greatest enemy of the forest tree is fire. Fire may not so frequently find its way to the woodlot as to the forest primeval, but it is nevertheless to be reckoned with; not the great, flaming all-consuming forest fire, but the creeping, seemingly insignificant ground fire which burns slowly through leaves and humus. A furrow around the woodlot will frequently serve as an efficient protection from such fires and prevent much damage.

The proper utilization and management of the woodlot is a broad subject. I shall have time only to mention a very few points. Proper cutting and judicious improvement thinnings are essential to promote the best development of desirable trees, especially if the woodlot is of native growth. In some types of woodlots, pruning is advisable, but frequently this will be unnecessary if not unwise. The most important feature is, of course, the harvesting of the crop of the woodlot, which will consist, so far as the ordinary farmer is concerned, of fence posts, fuel, poles, etc. A great many problems present themselves which cannot be solved satisfactorily except by a knowledge of silviculture and technical forestry. The students of agriculture may well become familiar with the fact that in such cases, advice may always be had at little or no cost from the Forest Service of the United States Department of Agriculture.

The essential points which I wish to impress upon all teachers of agriculture is the importance of the consideration of trees as a farm crop just as much as corn; and that the forest, in the form of the woodlot, has its place in agriculture which we cannot afford to overlook.

FORESTRY IN BOTANY.

The student of botany will, of necessity, make the tree the subject of a great deal of study. It is the best type of exogenous, or outside growing plant. The annual rings of the tree contain many an interesting story of the vicissitudes of its life history. We might dwell upon this interesting point for a long time but I must pass on. One type of inside-growing or endogenous tree is found in the palm family. It will interest the botanist to compare the form of the palm to that of ordinary outside growing trees and seek explanations for the differences.

The life processes of the tree are full of mystery and of interest to the student. We shall find it profitable to learn why a girdled tree dies in a season, but one whose entire trunk, except the bark and sapwood, has decayed will often thrive with no signs of injury for years, until blown down by some wind storm.

In considering that most fascinating of botanical subjects, seed dispersal, the trees furnish us an infinite variety of studies. We might collect and study the winged seeds such as those of the maple, elm, and basswood. The reproduction by seeding is well worth our attention, but we must not overlook that other type of forest reproduction, the coppice or sprout method, for this is not only interesting as a botanical study, but important from the side of forestry.

Should we consider the ecology of the forest, we find the light relation of trees evidenced in striking manner by the self-pruning of forest trees in comparison with the wide lateral branches developed in the same species where grown singly in the open. It is also clearly shown by the rapid reproduction which sets in when a clearing is made in the forest and the quick upshooting

of the undergrowth when it finds the upper story of the trees that cut off the light removed. Possibly the feature of the forest which is most unique and interesting in the study of light relations is the classification of trees into "tolerant" and "intolerant" species. To illustrate, we find the intolerant but quick-growing aspen rapidly covering burned or cut over areas, but it ultimately has to yield to the slow-growing but tolerant fir. The lesson which might be drawn from this natural phenomenon of the forest is obvious, but I am not given to appending morals to my stories.

Another ecological phase of forest life is found in the study of water loving types of trees which form the tree societies that line the banks of streams. Compare this with the effect of flooding upon similar trees, and we find the tree to be very temperate in its habits—it cannot stand too much to drink.

Again, temperature relations are shown by the appearance of the forests at timber line on mountain sides; and soil relations by the stunted growth of trees in poor soil as upon bare hills or when, perchance, a seed finds lodgment upon granite rocks where there is almost no soil for it to feed upon.

I remember that in the back of the text-book on botany which I studied, there was a chapter which was never looked into by students and which the teacher evidently did not care to tackle. The entrance to this chapter was guarded by a Cerberus-like word so formidable in its appearance that we never even attempted to find out what was concealed in those pages. The word was "Cryptogamia." Many of the members of the family of plants designated by this formidable name are found in the forest. I wish merely to introduce you to one—a riotous, destructive chap whose given name is "Fungus." If your excursions into the realms of botany are extensive enough, you may spend many hours studying the destruction wrought by fungi in the forest. Let us not altogether condemn him, however, for he is the scavenger which cleans up the aisles of the forest cathedral, and tears apart the fallen trunks of the monarchs of the forest, returning them to the dust from which they sprang, thus enriching the soil with humus and helping in a very important work of the forest.

FORESTRY IN GEOGRAPHY.

It would hardly be wise to close this rather hasty outline without adding a word as to the importance of the consideration of the forests in the study of geography. It is of the utmost importance that the student of geography should know something about the classification of lands in the United States and their value and productive powers. It is also desirable that he should know something of the forest resources of the United States, where the chief sources of our pine lumber and our hardwood supply are now found and about the rapidly vanishing redwoods and big trees of the Pacific Coast. He should know about the extent of the treeless regions of the Middle West and the deserts of the Southwest, where only cacti and sage brush grow.

The lumber industry, the fourth industry of the country in commercial importance, is treated in every geography worth mentioning and is full of interest in all its varied phases from the taking of the logs from the forest through the sawmill and lumber yards to their final utilization. But lumber is not the only product of the forest worthy of consideration. The long-leaf pine produces turpentine; spruce and poplar are used to make wood pulp for paper manufacture; the hemlock and tanbark oak are stripped of their bark for the tanner; and we are even paving streets with wood blocks very successfully. Each of these industries which I have briefly touched will furnish material for weeks of study if followed up in all its phases.

In closing I wish to present a subject which has lately come into great prominence in the affairs of the land, namely, the necessity for the preservation of the forests for the future benefit of the nation. Destructive lumbering and wasteful use have wrought havoc with the forests. Forest fires have swept over thousands of acres of timberland, destroying not only the trees but even eating out the rich soil, the accumulation of ages. There follows the washing away of unprotected soil on deforested slopes and destructive freshets which cover the lowlands with deposits of sand and mud. To prevent this waste of the wealth of the nation, Congress has established the National Forests. The spirit which controls the administration of the National Forests is set forth in these words—*Careful use*. The rangers who patrol the forests are there to protect them from misuse and destruction. Thousands of head of live stock are grazed on these forests every year, but the number per acre is carefully limited so as to protect the range from permanent injury. Legitimate mining is encouraged, but miners are forbidden to take up mining claims solely to secure the timber which may be found on it. Water power is not cut off from use, as is often stated, and lumbering is carried on, but under the supervision of trained foresters who see that all trees cut are closely utilized, provision made for leaving seed trees to insure reproduction, and the brush properly burned so as to minimize the danger from fires. All these features should be known to the student of geography, for in them lies the real reason why geography is worthy of a place in the public school curriculum; it is the study of man in his relations to his environment.





LESSONS FROM THE FOREST

THE HOLLOW TREE WILL THRIVE FOR YEARS

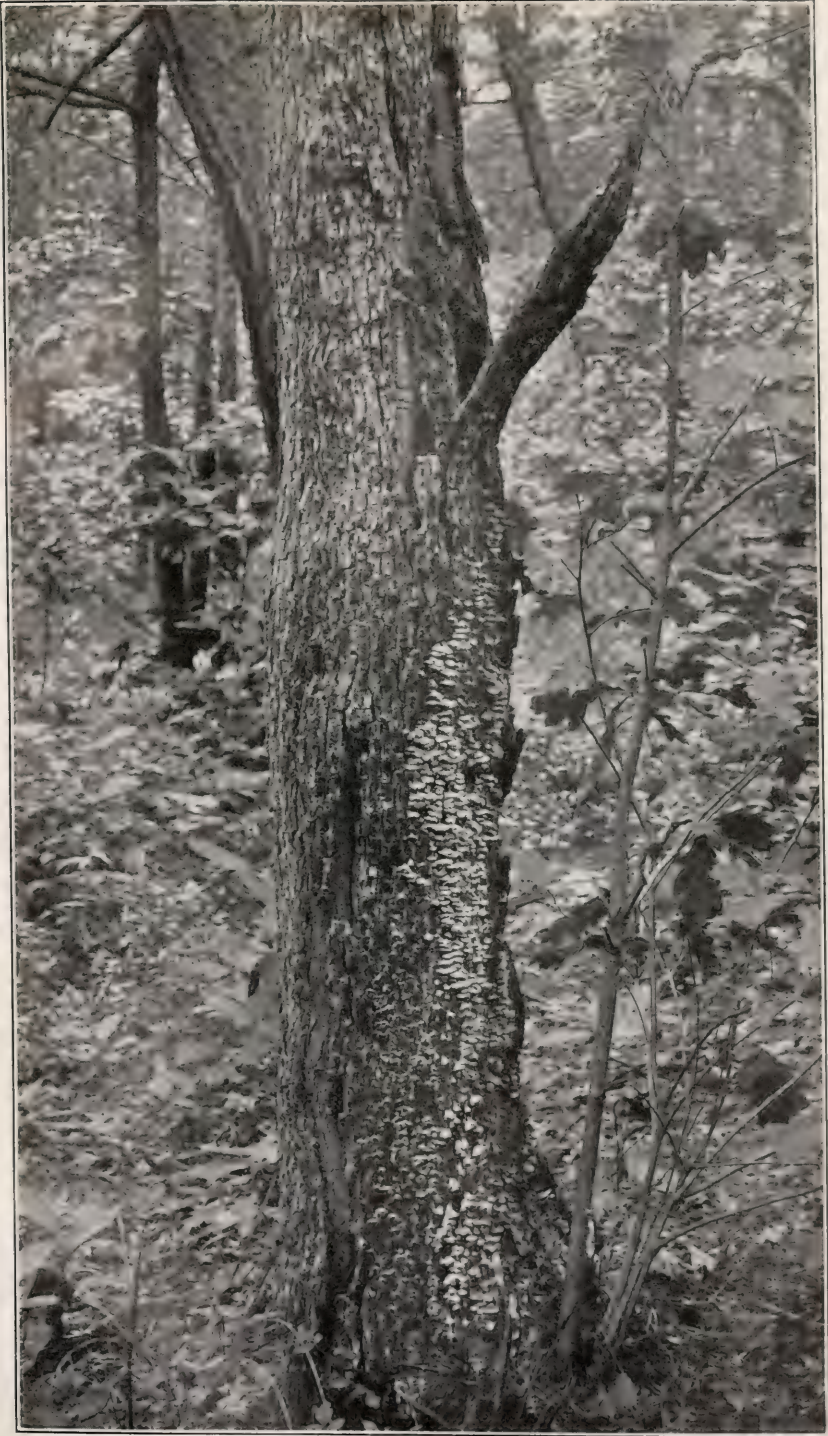


TOLERANT AND INTOLERANT TREES—AN INTERESTING
STUDY IN LIGHT RELATIONS



LESSONS FROM THE FOREST

WATER-LOVING TREE SOCIETIES THAT LINE
THE BANKS OF STREAMS



LESSONS FROM THE FOREST

ONE MAY SPEND HOURS STUDYING THE DESTRUCTION WROUGHT BY FUNGI IN THE FOREST



LESSONS FROM THE FOREST

THE GREATEST ENEMY OF THE FOREST TREE IS FIRE

FORESTRY PROGRESS IN NEW HAMPSHIRE

BY W. R. BROWN

SECRETARY OF THE NEW HAMPSHIRE FORESTRY COMMISSION

THE history of the inception and growth of forestry in New Hampshire of the measures and the men behind it, and of its present outlook, may be of general interest because, in a degree, it is typical of the growth throughout the country, and because the state is beloved of many; and of especial interest because of the attention that has been drawn to its remarkable mountain country by the movement for the establishment there of national forests.

Being naturally a wooded state, with forests that came well down to the shore of the ocean, and possessing an immense power of reproduction, the practice of forestry was not taken up in New Hampshire until after the Civil War. The great number of summer visitors, however, who came for the enjoyment of the wonderful scenery; the establishment of large lumber and pulp industries in the north; and the rapid increase of the portable mill, which diminished the stand of splendid pine that grew so abundantly in the middle and southern parts of the state, were the factors which brought the matter into the minds of a few thoughtful men after the state had sold its last timberlands in 1867.

One of the New Hampshire men to first conserve and replete was Honorable Isaac Adams, who, in 1878, planted a tract of forty acres in the town of Moultonboro to white pine in parallel rows four feet apart each way. This plantation may be seen today, although it has suffered for need of thinning.

Originally two-thirds of New Hampshire's total area, or 4,000,000 acres, was in timberland, much of it virgin growth, but through the abandonment of old farms and their reversion to sprouts, this has since been increased so that now three-fourths of our state is covered by growth of some kind. The depreciation in the quality of the stand was the cause of chief concern to far-sighted citizens, as cut over lands replaced old growth, burned areas came up to cherry bushes, and old pastures became improperly seeded. Over the northern section of the state the most characteristic species, spruce and balsam formed vast unsettled forests which covered the mountains almost to their tops, and were treated as unlimited reservoirs by the large lumber and pulp companies and cut without attention to reproduction, while in the southern half where deciduous trees were in preponderance, accompanied with the white pine, the country was opened by settlement, with the characteristic woodlot left on the farm. Two distinct problems were therefore offered for the practice of forestry. First, protection against extensive conflagrations in the north calling for a broad policy to protect a large area, together with the encouragement of a disposition to leave small trees standing; and second, in the south the organization of each separate town to fight local fires, with encouragement to replant the cleared lot, and perpetuate the rapid growing and profitable white pine.

Sometime in the seventies the old growth forest in that part of the Ammonoosuc Valley between the Twin Mountain House and Fabyans, and extending along the road from Fabyans to the Crawford House and westward to the base

of Mount Washington, was cut and completely burned and this loss of a much prized and well known region coupled with the growing interest to protect and conserve led the legislature in 1881 to appoint the first state forestry commission, consisting of Governor Hale and seven others, chief of whom was the Hon. Joseph B. Walker, who had worked assiduously in the state senate for its creation, helped largely in its investigations, and finally wrote out its findings in 1885 in an excellent and far-seeing report on the following subjects: (1) The area of forests; (2) their relation to the rainfall and climate; (3) trees and shrubs found therein; (4) forest management; (5) reforestation. Their report being finished they disbanded.

After the report of the first forest commission in 1885 nothing further was done until 1889, when the Governor and Council appointed a second commission, consisting of Joseph B. Walker, George B. Chandler and J. B. Harrison, who made a report in 1891, and forestry bills were introduced embodying their recommendations. Favorable action was not secured until 1893, when the legislature passed a law which created a forestry commission, to consist of the governor and four members, to investigate the extent and character of the original and secondary forests in the state; the removal and disposition made of the woods therefrom; all revenues derived; the damage done by fire; methods of lumbering pursued, and effects on the timber supply, water power, scenery and climate. This commission, which consisted of George B. Chandler, Napoleon B. Bryant, James F. Colby, and George H. Moses, got out the first official forestry map of the state, and for a few years thereafter laid the foundation of fact upon which to base a proper forestry policy. Little or no money was appropriated and the work done was left to the patriotism and loyalty to the cause of these men to awaken public interest. In 1895, however, the legislature empowered the commission to pay through the county one-half of the cost for fighting fire in unincorporated places, the other half to be borne by the owner, and passed more stringent laws against the setting of fire. They succinctly illustrated the general feeling of the times in their second annual report under the chapter heading: "Lumber vs. Forestry," and found their first problem to demonstrate the mutual interests which should bind the two.

Probably no one did more for the solution of this problem than Mr. Austin Cary, who commenced an exhaustive study of the northern spruce under the direction of Dr. B. E. Fernow, then head of the Forestry Bureau of the United States Department of the Interior. Mr. Cary applied himself to the practical solution of adapting foreign methods to American conditions; of demonstrating the practical value of conservation to pulp and lumber companies, and of securing the first practical cutting according to forestry methods. His careful research also of the insect and fungus enemies of the northern woods was of much scientific value. Up to the eighties lumber companies had cut only the larger trees for saw logs and unwittingly had left a considerable stand for future growth and reproduction. Upon the first advent of the pulp companies, however, this condition was changed for a period to a strip cut, and Mr. Cary's demonstration of the ultimate unprofitableness of this procedure was of inestimable value to the state. Studies by Henry S. Graves and others in 1894 of spruce under Adirondack conditions supplemented his work and a meeting of the American Forestry Association at Plymouth August 24, at which Joseph B. Walker, and George B. James spoke, aroused national interest in New Hampshire's problem, and an offer of co-operative assistance was made in 1898 to interested owners of woodland by the Division of Forestry, Department of Agriculture, at Washington, then under Gifford Pinchot.

In 1901 the legislature authorized the appointment of discreet persons by each town to control and protect the shade trees on the highway and tag them with a New Hampshire tag. It was unfortunately afterwards found that, however discreet such tree wardens might be, this act as it stood, was unconstitutional if contested by abutting owners. But as provision was made also for purchase and contest was not frequent, it has been of very material service in the protection of shade trees.

In 1901 the Society for the Protection of New Hampshire Forests grew out of the general interest. The first president was ex-Governor Frank W. Rollins, Joseph T. Walker was secretary, and Gen. George T. Cruft, treasurer, Philip W. Ayers was and is the forester of the society. Allen Hollis of Concord, succeeded Mr. Walker and is now the secretary. The society started with 230 representatives and distinguished members, numbering among them Edward Everett Hale, who, as a young man in 1825, helped in the first survey of the state to run town lines over the ragged peaks of the White Mountains, and was throughout his life a warm exponent of all that made for the protection of their forests and scenic beauty. It has continually added to its numbers and resources and has obtained strong support from outside the state, especially from the neighboring commonwealth of Massachusetts. Its unofficial nature and consequent freedom to act and advise has enabled it to become one of the most potent factors towards progress in the state. The purpose shown by its initial constitution was:

To encourage forest growth.

To disseminate knowledge upon planting, managing and harvesting the forest crop.

To establish a nursery for distributing small trees and seed.

To establish demonstrating forests.

To preserve scenic places and high and steep slopes of mountains.

To conserve growing forests and secure legislation.

Since its establishment it has given especial encouragement and aid to scientific reproduction of the forest and maintained its own nursery; has advocated state control, state forests, larger co-operation with the federal government and other forestry associations, and its annual meetings, which have lately been held in the White Mountains during the summer season, have brought together many distinguished guests and visitors. Working plans for improvement cutting have been made by Forester Ayres for many institutions throughout the state, such as the Concord Electric Company, Concord Water Works, and St. Paul's School. The care of the Dartmouth College grant of 26,000 acres was placed in his hands. The society has recently been made trustee for the residents around Lake Sunapee of a forest reserve of 700 acres on Sunapee Mountain, which was generously purchased and given by Herbert Welch and Mrs. Covill of Philadelphia, Mrs. John Hay of Washington, and Richard M. Colgate of New York.

Nineteen hundred and three also saw the commencement of the agitation for a national forest reserve in the White Mountains, largely through the influence of this association. Through the efforts of the Forestry Commission resolutions passed the legislature giving consent and approval to any action to establish such a reserve by Congress. Senator Gallinger presented a bill in the Senate in December, 1903, to the 58th Congress. This was favorably reported on from committee by Senator Burnham at the second session, but was not brought to vote before the opening of the 59th Congress. A bill which had subsequently been drawn up to combine the White Mountain reserve and the Southern Appalachian reserve was introduced again in the Senate by Senator Gallinger and conjointly in the House by Representative Currier. This passed the Senate but was held up in the House Committee of Agriculture. The supporters of the bill obtained a two days' hearing before this committee

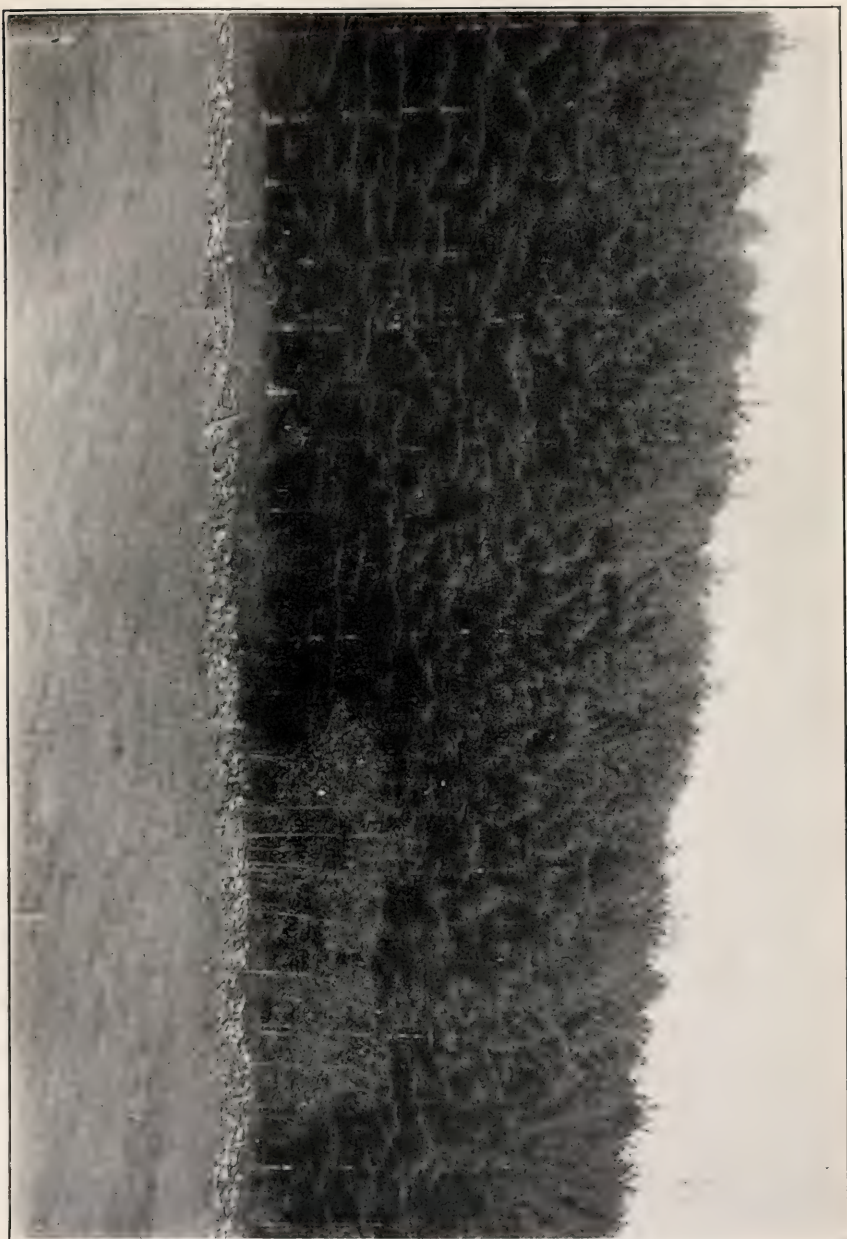
at which Governor Glenn of North Carolina headed the petitioners, and New Hampshire had Governor McLane as its spokesman, together with the secretary of state, council and members of the legislature and officers of the Society for the Protection of New Hampshire Forests. Both the Governor and Mr. Harvey N. Shepard of the Appalachian Club, spoke eloquently in its favor. The committee reported the bill favorably to the House, but it was held up by the Speaker until the House adjourned. Since then another modified bill has twice passed the House and is slated to be taken up by the Senate at the coming session.*

In 1903, through the joint efforts of Philip W. Ayres, for his society, and the commission, which then consisted of Henry O. Kent, George E. Bales, Marshall C. Wentworth and George H. Moses, an appropriation of five thousand dollars was obtained for a forest examination of the White Mountain region and the completion of the forest map which was commenced in 1893. This examination was prosecuted during the same year by Mr. Alfred K. Chittenden of the United States Forest Service, who made a most excellent and exhaustive report on the character of the more important trees and of the conditions necessary to their successful reproduction. His study of the lumber and pulp industries, of the farmers' woodlot, of forest planting, and his recommendations thereon, proved to be a classic of complete and wise advice, and laid down the fundamental lines along which all of the subsequent progress has been made. In conjunction with his work a study was made by N. C. Grover and H. K. Barrows of the United States Geological Survey of the hydrography of the White Mountain region. This investigation began the compilation of many tables on stream flow but was abandoned because of the time necessary to secure sufficient data. Owing to the cutting off of the appropriation for the purpose the work of stream measurements was stopped throughout New England, thus making practically useless the data already obtained, since observations for long terms of years are necessary to attain any results of scientific value.

Another important report upon the forest and water conditions of Northern New Hampshire was embodied in the report of the Secretary of Agriculture to Congress, under the act of 1907, appropriating \$25,000 for an investigation of the Southern Appalachian and White Mountains, with reference to the proposed national forests. This report was prepared under the direction of William L. Hall of the United States Forest Service, and the material was gathered by the united work of Forest and Geological Survey experts, making a valuable contribution to the knowledge of the conditions and opportunities of this region. In this connection may be also mentioned the report issued in November, 1909, by co-operation between the New Hampshire Forestry Commission and the United States Forest Service. This was an accurate and comprehensive study of the "Commercial Importance of the White Mountain Forests." It was prepared by Philip W. Ayres, Forester of the Society for the Protection of New Hampshire Forests and issued as Forest Service Circular 168 by the United States Department of Agriculture.

The first public land under the new conditions came to the state through the exercise of their right of condemnation and purchase under the law, through the generous gift by Joel H. and Arthur E. Poole of Jaffrey, and Isaac Sprague of Boston, who made an offer of \$8,000 for the purchase of 500 acres on the side of Mount Monadnock in the town of Jaffrey, which is now held as the state's first public park.

*A detailed account of "The Fight for the Appalachian Forests," by Edwin A. Start, was published in this magazine, then known as *Conservation*, for May, 1909. That article preserves the record of the hearings and of the succession of bills and their history up to the close of the Sixtieth Congress.



WHITE PINE FOREST PLANTED THIRTY-FIVE YEARS AGO
ON STEEP BARREN WEST SLOPE



MT. MONADNOCK, NEW HAMPSHIRE, THE LINES
SHOWING THE STATE PARK



DENSE YOUNG GROWTH OF SPRUCE ON OLD
PASTURE, NORTHERN NEW HAMPSHIRE



DENSE REPRODUCTION OF PINE ON AN OLD
PASTURE, SOUTHERN NEW HAMPSHIRE



A MOUNTAIN FIRE LOOKOUT STATION IN MAINE



WHITE PINE TRANSPLANTS IN NURSERY OF NEW HAMPSHIRE
FORESTRY COMMISSION, PEMBROKE, N. H.

In 1905 Jason E. Tolles and Robert P. Bass were appointed on the forestry commission and the fire law was revised to make the chief of the fire department in each town responsible for the extinguishment of brush fires, as forest fire warden. Penalties for setting fire were made more severe, but the towns or owners still paid all bills.

In 1906, through the generosity of Gifford Pinchot and department, an additional study was made possible in the southern half of the state to supplement the work done by Chittenden in the north, and Charles A. Lyford, M. F., and Louis Margolin, F. E., conducted investigations and prepared tables on the growth of white pine, of particular scientific value to the whole country, giving the rotation and the expectation profit from planting, and data to show its advantage as an investment. Their report also showed the growing need of reform, especially in the southern part of the state, in the manner of taxing forest lands and the inequalities and abuses of the present system and laid down the general lines upon which procedure should be made towards exemption.

In 1908 the state received an additional gift of the reservation of 60 acres of pine in the town of Jaffrey, generously made by Miss Frances A. L. Haven of New York City.

Robert E. Faulkner of Keene, served on the commission as its secretary in 1907-1908, and by the disinterested gift of his salary made possible the establishment of the first mountain lookout fire station in the state. In the same year the commission, with the active co-operation of the United States Forest Service, instituted an investigation of the taxation of forest lands, and the efficiency of the fire laws in New Hampshire, and much original data was secured of great value in the scientific study of the taxation problem, both in the state and country at large.

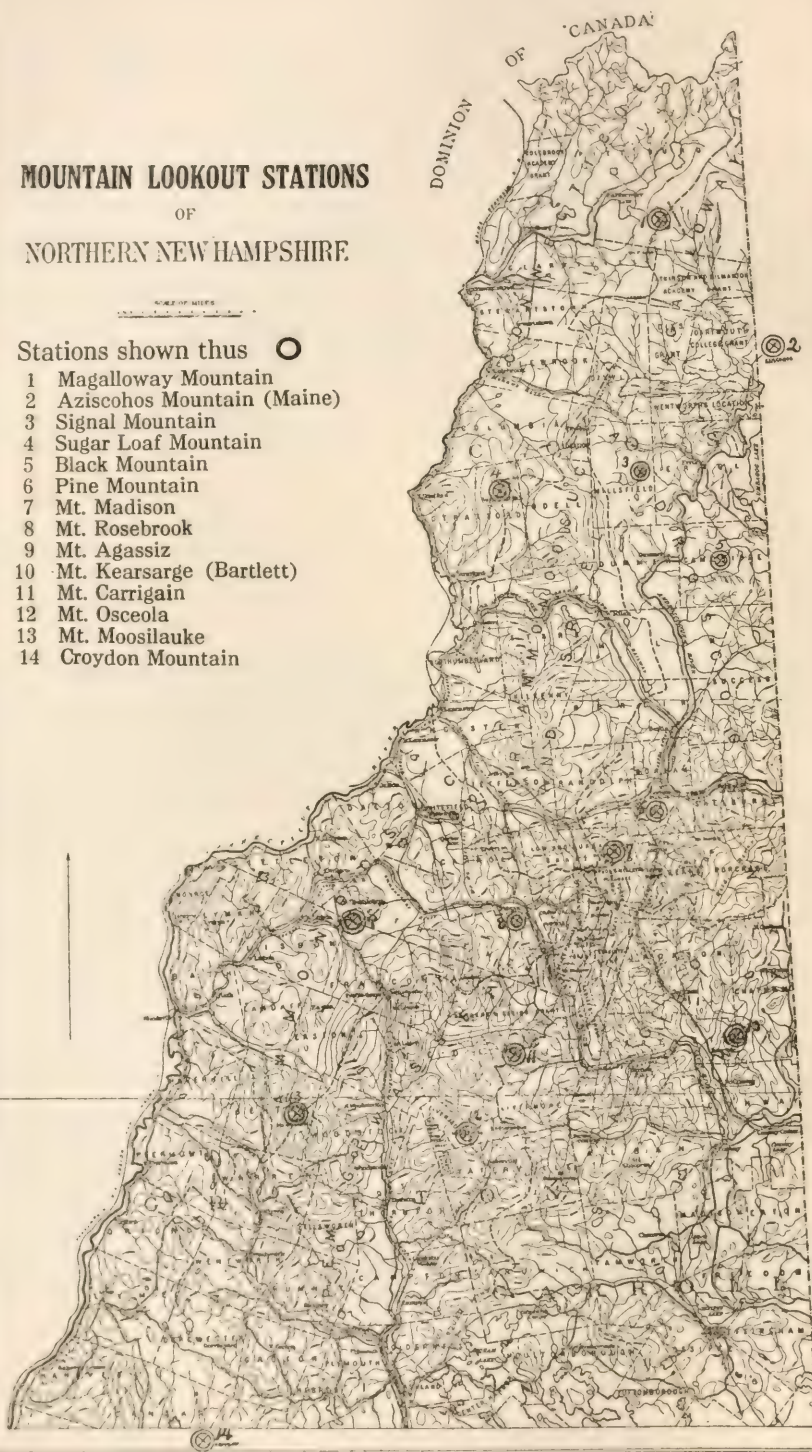
Through the efforts of many clear-sighted, unselfish citizens, of the able members of the forestry commission, and not least of the Society for the Protection of New Hampshire Forests, the subject of scientific forest management and development, had by this time come to be a recognized public economic question of the highest importance.

Largely through the efforts of Mr. Robert P. Bass, then a member of the commission, the legislature of 1909 passed a much enlarged and improved forestry bill, which called for a smaller commission, a state forester, reorganization of town fire wardens, and the state to share expense conjointly with the towns in fighting fire. Provision was made for educational and protective work, but the amount appropriated by the legislature was insufficient to cover anything but the actual expense of putting out fires and maintaining the department. Mr. Robert P. Bass, Mr. Jason E. Tolles and the writer, were appointed on the new commission authorized by this law. Mr. E. C. Hirst of the Yale Forestry School, was appointed state forester. Two hundred and twenty-five town fire wardens were then appointed by the state forester. Bulletins were issued and lectures given. A call for a meeting at Gorham, N. H., in March, 1910, of the large timber land owners, was widely attended and addresses showing the advantages of co-operation and combination in reducing fire risk were made by William T. Cox, assistant forester of the Service at Washington, E. E. Ring, forest commissioner of Maine, A. F. Hawes, forester of Vermont, Austin Cary, superintendent of state forest lands of New York, and E. C. Hirst, forester of New Hampshire, and a subscription was secured which enabled the state forester to establish and maintain during that summer fourteen mountain fire lookout stations over the northern forests of the state. A small state nursery was started by the members of the commission personally, and the general interest in this was evidenced by orders coming in almost immediately for more than its total production. It is hoped that this nursery will be taken over and provided for by the state.

MOUNTAIN LOOKOUT STATIONS OF **NORTHERN NEW HAMPSHIRE**

Stations shown thus ○

- 1 Magalloway Mountain
- 2 Aziscohos Mountain (Maine)
- 3 Signal Mountain
- 4 Sugar Loaf Mountain
- 5 Black Mountain
- 6 Pine Mountain
- 7 Mt. Madison
- 8 Mt. Rosebrook
- 9 Mt. Agassiz
- 10 Mt. Kearsarge (Bartlett)
- 11 Mt. Carrigain
- 12 Mt. Osceola
- 13 Mt. Moosilauke
- 14 Croydon Mountain



Through the activity of the town fire wardens the state's legal department was able to secure the trial and conviction of a few cases of incendiarism. The first annual convention of town fire wardens for mutual co-operation and exchange of ideas was held at Bretton Woods during the first week of August, 1910, in conjunction with the annual meeting of the Society for the Protection of New Hampshire Forests, and addresses were given by Governor Quinby, R. P. Bass, chairman of the commission, the state foresters of Massachusetts, Vermont, New Hampshire and others. In October, 1910, the timberland owners effected a permanent organization for further protection and co operation along the lines of the western protective associations.

Much, however, remains to be accomplished. As fire protection is distinctly a function of the state the advisability of establishing four general fire districts and a paid district chief over each, is felt to be much needed. The district chief, working under a salary, can organize the town fire wardens in his section and take many necessary measures towards prevention. An additional appropriation is needed for paid patrol during the fire season, tool and provision supply storehouses, maps, construction of fire trails and fire lines, and an addition to the number of mountain fire lookout stations. More stringent methods are thought to be necessary to reduce the frequent cause of danger from locomotive sparks and the burning of brush. An enlargement of the state nursery is called for by the demand for seedlings. The excellent New York state law requiring the lopping of the branches from the felled tops of soft wood trees, so that the stem falls to the ground, should be carried out. Small lots for the practical demonstration of forestry methods should be established at different points throughout the state, and special emphasis laid on the need of intensive cultivation of poorly productive forest land, and the conservative cutting of the existing stand for the future conservation of one of the principal industries of the state, lumber, paper and pulp, and the reservation of her scenic attractiveness for the protection of the rapidly growing summer business. Especially should interest center upon the preservation of what we now so richly enjoy in the way of natural forest reserves, and, in the words of Gen. C. C. Andrews, the veteran forest commissioner of Minnesota (who failed to secure but a part of the appropriation he urged as necessary to the protection of his state shortly before the great fire): "The best way to put out fires is to prevent them."



THE LAKE STATES FIRE CONFERENCE

A Working Meeting that Accomplished Results.

AN ASSEMBLY of national and state forest officers and other officials, railroad, insurance, and lumbermen, from the three great lake states—Minnesota, Wisconsin, and Michigan—made up the conference in Saint Paul December 6th and 7th, for the discussion of the causes and prevention of forest fires in the three states. These men were vitally interested, paid the closest attention, and remained through every session to the end. The work of the conference had been thoroughly considered and planned beforehand, especially in Minnesota and Wisconsin, and the gentlemen who attended were fully prepared to go right to the heart of the subject. These facts establish the significance of the meeting.

Governor Eberhart of Minnesota, who took a deep interest in the conference, was especially pleased at the outcome and will make recommendations to the legislature based upon the resolutions. The principal result of the conference, however, is looked for in the effect upon public sentiment.

The conference was arranged by the Minnesota State Forestry Board and the Minnesota Forestry Association. It was in the minds of the promoters and of all those who took an active part in the proceedings that the time has gone by for generalizations, that the broad principles of forest conservation are admitted, and that it is full time to get down to working details and actual results. Fire prevention stands at the head of the list of essentials and the deplorable losses of the past season have placed striking emphasis upon its importance. Here, then, was a point of approach in which foresters, timber-land owners, railroad men, insurance men, and indeed the whole body of citizens were directly interested and their interests were at one.

The recommendations embodied in the resolutions are summed up in a demand for non-partisan forestry commissions in each state, with as full powers as are permissible under the state constitutions. Wisconsin already has a good foundation for this organization, its present board and forester only needing enlarged powers and appropriations. Minnesota is not so well and consistently organized, but the vast state property involved (Minnesota still has three million acres of state lands), and the consequent wealth of the state, which enjoys freedom from state taxes, make it probable that the state's lawmakers will work out the reorganization successfully. The prospects in Michigan are not so easily estimated, as the state's attitude and public sentiment are not so well defined. Leading railroad and lumbermen who were present at the conference expressed the opinion that the railroad and lumber interests would not oppose but would support the carrying out of the recommendations.

There were several valuable papers read at the conference, all of them sharing the business-like character of the general proceedings.

The paper by General C. C. Andrews, forestry commissioner of Minnesota, we print in full. A paper by Henry S. Graves, chief forester of the United States, on "What the Forest Service Does to Prevent Fires," was read by William L. Hall, assistant forester of the United States Forest Service. The

ground has been quite fully covered in articles by Mr. Graves in recent numbers of AMERICAN FORESTRY. C. R. Pettis, superintendent of state forests of New York, gave an address on "How New York Prevents Forest Fires." A paper by Edward T. Allen, forester of the Western Forestry and Conservation Association, was read by J. E. Rhodes. The substance of this paper will be contained in an article on the work of his association which Mr. Allen is preparing for this magazine. In a supplementary letter read by Mr. Rhodes, Mr. Allen made these definite recommendations for the essentials of an effective state policy:

1. A state board of forestry selected with the single view of securing the most competent expert judgment on the matters with which it deals. Elective or otherwise political representations should be eliminated, with the single exception of the governor himself, and the latter should be restricted in his appointments to the representatives of the agencies most familiar with forest management, like forest schools, lumbermen's associations, forest fire associations, conservation associations and the federal Forest Service, etc.

2. A trained state forester, wholly independent of politics, chosen by the board largely for his demonstrated ability in executive and practical work. Here is one place not to economize, but to get the best available, for upon him depend the successful development and execution of a rational, far-seeing policy, the organization of fire work, the tactful enforcement of law, and the effectiveness of the educational campaign. He should have one or more assistants of his own appointing.

3. Adequate funds and authority in the state forester's hands to get the assistance necessary to enforce the fire laws, apprehend violators, and secure evidence for their conviction, where local means of doing this is not effective. The property owner can not act in this successfully and local county officials often fail to give the subject proper interest.

4. Funds and organization enabling the state to patrol and fight fire, where these steps are necessary to protect life and property, but where the interest of forest owners or the intelligence of local authorities are insufficient to provide any such protection. Local effort should be sought to the greatest possible extent, but where it does not exist the state's responsibility to protect its citizens from distress is all the greater.

5. Funds and organizations with which the state can encourage and cooperate with local effort, whether by counties, towns or forest owners' associations. Seldom, if ever, can these afford to bear the entire burden of a system as effective as public welfare demands. Nor is it fair that they should, for the entire state participates in the benefit. Nor will the public at large ever take the proper interest in fire prevention, in good laws, and in good officers, until it has a financial stake in the system.

6. Clear, detailed and comprehensive fire laws, bearing rigidly and justly upon all classes alike, whether railroad, lumberman, camper or settler, but flexible in application to differing localities and seasons. Since enforcement, rather than to secure penalty for violation, is their object, the penalties should not be so heavy as to deter conviction, but the prohibitions should be strict. There should be penalty for neglect by any proper officer or magistrate to enforce them.

7. Application of forestry principles to the management of all state-owned forest lands and ample funds for the purchase of land suited better for state than for private forestry. Until the state shows confidence in forestry, individuals can not be expected to.

8. Encouragement of private reforestation by assessing deforested land annually on land value only, unenhanced by reason of any growth thereon, and deferring taxation of the crop until it furnishes revenue with which to pay the tax.

9. Systematic study of forest conditions and management, to afford basis of intelligent administration, further legislation, and the public and private practice of forestry.

10. Sustained systematic publicity and educational work, with specific advice to those who desire to improve their methods. When everyone understands the importance of forest preservation it will be secured without trouble; and the state is the proper exponent.

11. Close and constant conference with properly accredited representatives of private forest industry. Business and technical considerations are involved if the state activity is more than a name. Independent action will fail to get the best results even if it does not invite actual friction.

12. Through the study of this subject of taxing the mature timber, to the end of adopting a system which, by insuring fair revenue without enforcing bad forest management, will result in general community good.

Marcus Schaaf, state forester of Michigan, discussed the forest laws of that state, and Edward M. Griffith, state forester of Wisconsin, discussed conditions in that state.

At the Wednesday sessions C. V. R. Townsend of Negaunee, Michigan, described the protective methods of the Cleveland-Cliffs Iron Company. R. H. Aishton, vice-president of the Northwestern Railway, spoke on "The Interests of the Railroads in Protecting the Forests." This address appears on another page. The next speaker was Thornton A. Green of Ontonagon, Michigan, president of the recently organized Northern Forest Protective Association, whose address on "The Interest of the Lumberman in Practical Forest Legislation," we also print on other pages.

The closing session was given to a general discussion, and Wednesday evening the members of the conference were entertained by the Commercial Club of Saint Paul at a banquet at the Saint Paul Hotel.

A noteworthy feature of the conference was the fact that notwithstanding the varied interests that were represented, the resolutions received unanimous and hearty approval, a fact which promises well for putting them into effect. The committee was made up of T. A. Green, J. C. Knox, Thomas B. Wyman, R. M. Aishton, and F. E. Michelson, representing Michigan; E. M. Griffith, J. F. De Vor, W. H. Bissell, W. A. Holt, and William Bray, representing Wisconsin; W. A. McGonagle, J. C. Matchitt, H. Oldenberg, A. F. Woods, H. R. Mackenzie, and E. G. Cheyney, representing Minnesota.

THE RESOLUTIONS.

Resolved, That we recommend to the legislatures of our states:

First, that the forest fire protection of each state and such other branches of state work as may be deemed best to combine with it, be placed under the control of a non-partisan commission empowered, as fully as possible under the constitution of the different states, to carry on the work, and under civil service rules. Such commission should represent all the interests involved as far as possible, and we recommend that such commission place the work in charge of a chief forester who should be a professional graduate forester and that the commission employ such trained foresters and other assistants as may be necessary; define their duties and fix their salaries; said employees to be engaged under such civil service regulations as the commission may prescribe.

Second, that it is the sense of this conference that the present forest fire warden service of Michigan, Wisconsin and Minnesota is totally inadequate to meet the existing fire hazard to both life and property, and that forest protection service, to become efficient, must be greatly extended. To this end we recommend an adequate forest patrol system, maintained by the state, organized and operated by the commission referred to.

Third, that the commission be authorized to coöperate with the national government, the several adjoining states and such associations and organizations as the commission may find necessary to best protect the timber resources of the state.

Fourth, that this conference is opposed to a general slash burning law, as experience has proven it unsatisfactory, impracticable and dangerous. We recommend, however, that the commission shall be given authority to order the disposal of dangerous slashings sufficient to establish a safe fire line around standing timber or other valuable property.

Fifth, that this conference advocates legislation providing strict regulation of the burning of brush and debris in clearing land during the dry season, such burning to be under the direction of state fire patrolmen, under such regulations as the commission may prescribe.

Sixth, that the burning of all debris on the rights of way of the various railroads be under the control and direction of the state forest patrol. Further, that under special conditions as directed by the state forest patrol the railway companies maintain a patrol, properly equipped following their trains, also that all railroad and logging locomotives and traction engines must be equipped with the most practical spark arresting devices (subject to inspection and approval of the commission).

Seventh, whereas the building of fire lines around exposed property, including settlements, villages and towns has proved a most effective means for the control and extinguishment of fires, we recommend that one of the principal duties of the patrolmen, working under the direction of the commission, should be to establish such fire lines where necessary for protection of property.

Eighth, we recommend as the most effective measures for preventing and fighting serious fires, adequate means of transportation and communication, to include trails, telephone lines and lookout stations, and that the efforts of the commission should be exerted toward the construction and establishment of the same as rapidly as consistent.

Ninth, the appalling sacrifice of life and the continued great loss of state and private property resulting from fires in our forested area, are a disgrace to our civilization and a most serious drain upon our natural resources, and we believe that the expenditure of such amount as may be necessary to prevent these losses is fully justified.

We therefore recommend that the appropriations by the state legislatures to maintain forest protection should be sufficient to provide for a forest patrolman for each forty thousand acres requiring protection as well as for the expenses necessary to successfully carry out all of the measures suggested by these resolutions.

We recommend in addition to the patrol system an auxiliary county fire fighting force to be appointed by and under the direction of the commissioner, to be paid by the state and charged back to the county. Such expense ultimately to be borne by the counties or towns in which the fires occur.

Resolved, That as it is shown by statistics that there are a large number of fires set each season through the carelessness of the general public, including campers, fishermen, hunters and others, we recommend that a campaign of education be carried on energetically through every possible channel to the end that this hazard be reduced through a better understanding of forest conditions by all the people.

Resolved, That the sincere thanks of all the delegates and attendants here be extended to the officials of the state of Minnesota and the city of St. Paul, who have contributed so largely to the success of this conference, to the Manufacturers' & Jobbers' Association of St. Paul for the courtesies shown; to the management of the St. Paul hotel for the facilities so freely extended, and to the press for its treatment of the proceedings of this Lake States Forest Fire Conference.

LUMBERMEN AND FOREST LEGISLATION

By THORNTON A. GREEN,

PRESIDENT OF THE NORTHERN FOREST PROTECTIVE ASSOCIATION.

(An address delivered at the Lake States Conference, St. Paul, December 6.)

THE lumbermen of Minnesota, Wisconsin and Michigan do not seem to have paid a great deal of attention to forest legislation in the past, except to oppose a few laws that seemed about to lay an unnecessary burden upon them. Until very recently the legislatures of these states had enacted few practical laws. The lumbermen now are fully awake to the necessity for some action that will give better protection to their timber lands. Changes in the statutes are likely to be made in all three states this coming winter and the lumbermen are most vitally interested in any changes that may be made.

The lumbermen's chief asset is standing timber. Mills, railroads and equipment are practically valueless if there are no timber resources behind them.

There is a marked increase in the amount of timber offered for sale by the non-operating timber owners as well as by the operators. The prices that have prevailed for several years are being shaded in consequence. Forest fires have had much to do with this weakening of timber values.

Many lumbermen must, of necessity, resort to bond issues in these times of high values of stumpage and high cost of labor and supplies, coupled with the low price of lumber at the point of production. Standing timber is the principal security for these bonds. It is only by exercising great care in the protection of our timber resources that timber bonds can be kept at par.

Insurance upon the plants and output of the lumber companies always has been comparatively high. Unless something is done to lessen the risk from forest fire exposure many lumbermen and lumber towns will find it difficult to obtain adequate insurance at reasonable prices.

When the modern lumberman builds his mills and railroads he estimates the probable life of his plant by the amount of timber he has. Any loss of timber follows through every step of his operations. In many cases the added expense of producing logs from burned timber is more than the actual loss of stumpage.

When forest fires are extensive there is an over-production of lumber because of the cutting of burned timber to save it. Over-production always means low prices.

There is one loss in timber that is greatly exaggerated by forest fires. The decay following fires causes a large increase of the insect enemies of growing timber. In the northern peninsula of Michigan bark beetles and borers attacked the burned hemlock and pine immediately after the great fires of last July.

In the future we may look for a more rapid decay of every imperfect tree growing near the burned districts. Great numbers of trees not burned will die from the attacks of insects as the indirect result of the fires. For many years the owners of mixed hardwood and hemlock timber lands thought themselves almost immune from fire loss. The leaf fires of October and November, 1908, were new to many owners. That year and the next it was thought little damage had been done. The contrary is now known to be true. A considerable part of the burned districts are dead or dying. This last summer we saw large areas of mixed timber, containing very little pine, burned so badly that the trees were all killed immediately. Hardwood trees burned like conifers.

We have figured in the past on getting the bark from the burned hemlock trees. This year they were burned so badly that the bark already is decayed and has been fairly riddled by woodpeckers and sapsuckers in search of the swarms of bark beetles that have infested the trees. Where the timber was burned last summer very little bark will be gathered next season.

A brief description of how a lumberman makes money from our forests may not be without interest.

Assume that he has paid \$15,000 for a group of timber and upon cutting it and after paying all the bills and selling his lumber he has \$17,000. In other words, he has made two thousand dollars. Then he finds he needs more timber. He tries to replace the acreage he has cut and is compelled to pay \$17,000 for it, just what he took out of the first tract. This performance is repeated year after year in the hope that future manufacturing profits may be larger. He rarely makes a dollar sawing lumber and often loses. If he manages to wind up his operation with about as much timber as he started with, he makes money because of the natural increase in timber values. If some of the timber land left has been burned over, the operation likely will show a loss and not a gain. The lumber business is largely one of book profits today. Cash dividends do not come with regularity.

These are some of the reasons why the lumbermen are interested in laws for the protection of forests, but I do not mean to imply that they alone are interested. The entire country is aroused to the necessity for action. It has been difficult in the past to convince the residents of the unforested parts of the lake states that they have a common interest with the lumbermen in the protection of the forests. They are beginning to understand that the lumbermen are less interested in protecting the remaining forests than they are. The owners have an average value in their stumpage of about \$2.50 a thousand and they disburse, in the process of reducing the tree to a marketable product, about four times that amount.

The public, realizing at last that the wanton destruction of the forests means a distinct loss to everyone, demands that something be done; and something will be done. Such vast resources have been destroyed by fire in recent

years, coupled with a heavy loss of life, that the people will not be denied. There is only one way open to them—the law. New laws and amendments to existing laws are proposed on every hand. Some of them single out the lumberman as the scapegoat, a few place the burden upon the railroads. The records of Forester Griffith, of Wisconsin, show that 60 per cent of all the fires in the five years preceding 1910 were set by homesteaders, 15 per cent by railroads, and 25 per cent by campers, careless hunters and others, including the lumbermen. It seems probable that the number of fires for which the lumber companies are directly responsible are not many. Few people respect the forests as they should. Some abuse the railroads for setting fires and then throw lighted cigars and cigarettes from car windows in dry seasons. There is altogether too much carelessness. Fire is a terrible scourge. It is not to be played with.

The experience and training of average lumbermen should enable them to be the best judges of what is practical legislation for the protection of forests from fire, while the people in general are not well informed on these matters.

Few outside the lumbermen and forests understand the difficulty of enacting laws that really will help the situation. Many laws that have been passed in the various states in recent years have made matters worse instead of better. Some laws actually have set a premium on setting fires by providing such high daily wages for fire fighting that fires were set to get the money. New York was compelled to change her laws to stop that practice. Several other states will soon follow her lead.

The so-called self-dumping-ashpan law, passed by our national Congress a few years ago, has proved to be a source of many railroad fires.

The Minnesota law passed at the last session of the legislature that provided for the burning of the slashings left by the lumbermen has proved to be impractical, in fact, very dangerous. An attempt to burn slashings by a large operator during the last season resulted in the burning of 200,000,000 feet of white pine.

Men have said in public that the lumbermen should not be allowed to make any slashings. While such a demand is ridiculous it is no more so than a general slash-burning law would be. Advocates of such a law surely do not realize what they propose to make the lumbermen do. They have not stopped to think that very few people own solid blocks of timber, that there may be neighbors who are completely surrounded by slashings. The days when slashings of that kind, in most timber, could be fired without damage to the adjoining stumpage would be few and far between. In fact, at no time during the summer months is it safe to set large fires, for when once started they creep into the roots and moss and smolder for weeks, so that a high wind may fan them to a blaze at any time. These ground fires have been known to last from midsummer until snowfall, and even through the winter. Some will suggest waiting until winter to burn cutover land. The early part of the winter finds the fuel too wet and later the snow is too deep, in many parts of the lake states. In mixed timber there are many small trees and defective mature trees left after logging. In a few localities the immature trees may become valuable timber stands if allowed to grow. Nearly all the timber remaining is valuable for wood and is the chief source of the settlers' income during the first few years they occupy their farms. My own personal experience leads me to believe that this valuable remainder cannot be saved where slashings are burned.

In the hemlock forests the bark must be peeled in June, July and August, and often a year's supply of logs is cut then. Long before winter comes those slashings are as dry and dangerous as any. Where the hemlock and hardwood timber stands thick upon the ground a great deal of small timber will

be killed by the heat when the land is burned over. Even where great care is exercised such will be the result. In a very large number of cases there is more fuel for fires a second year than there was at the first burning. This is not true of solid pine stands, but Michigan and Wisconsin have very little of that kind of timber left.

The burning of slashings in most cases only relieves the situation temporarily, for no one fire will take the stumps and old wet logs, which when well rotted burn like tinder, and these, together with the brakes, wintergreens and other vegetation that naturally springs up in all burned districts, find a fire as quickly and as surely as the original slashing. Many remedies considered impractical might be of value if the average labor that can be found for the work could be relied upon to use judgment and care. That class of labor seems to have almost disappeared from the earth. The cost of burning the slashings must not be lost sight of because any added expense will prove ruinous to a large number of lumber manufacturers at this time.

The price of lumber at the mills is very low and admits of no profit to the producer. Hemlock lumber at the saw mill is now worth just about what it was ten years ago, and there was very little profit in it then. Our mixed timber forests of Wisconsin and Michigan contain 50 to 80 per cent hemlock. The present stumpage cost is three times what it was then, and the manufacturing costs have increased considerably.

Without question, the only cheap way to burn slashings, in general, is to set fire to large areas and allow the fire to run before the wind. Anyone making a practice of burning that way hardly will be regarded as a good neighbor. If slashings are to be burned, they must be burned with great care. In heavy, mixed timber the cost will then be prohibitive. But we all will admit that something must be done and at once. In the first place, the timber owners must help themselves, after that they may expect some help from others.

By concerted action the lumbermen can show the country that they are taking an intelligent interest in the protection of our forests. Unless they combine their efforts to prevent it they may expect much impractical legislation in the next few years. There must be a campaign of education to spread the truth. The public still needs educating.

A little over five years ago I organized the Michigan Forestry Association, and, outside of a very few, I could find no one who understood what I was talking about when I discussed problems such as we are discussing here. Today everyone knows something about these matters and nearly everyone takes a lively interest in them. Five years more with a proper educational campaign and the average citizen will be able to solve some of the difficult problems we must meet in trying to save our remaining forests from devastation by fire.

There is no better way to prove that the timber owners mean to do their share in this matter than by active organizations, the object of which shall be to prevent forest fires as far as it is possible to do so. The timber owners of the Pacific Northwest are banded together in a dozen or more associations whose object is the prevention of forest fires. They are trying to educate the rest of the people to help them by being more careful. Their rangers fight the fires that do start, and they have been very successful. During the last season when Washington, Oregon, Idaho and Montana were swept by a perfect hurricane of fire, comparatively little damage was done on the timber lands patrolled by them. Many fires started but few of them gained headway enough to cause extensive loss. The rangers of one association put out about 1,200 fires last season.

I recently organized the Northern Forest Protective Association along the lines of the western associations. It started out with a membership represent-

ing 2,000,000 acres in the upper peninsula of Michigan and it is expected that there will be 4,000,000 acres in the association within six months. The organization is broad enough to take in all of Wisconsin and Michigan.

A thorough private patrol backed by a law like that proposed for Wisconsin, under which the state would provide a regular patrolman for every 40,000 acres or less of forest land, will go a long way toward eliminating fires. The only laws that will be of any avail will be those that will help the state, and private owners do that work.

Some say that the lumbermen never have stood their share of the taxes. I will venture to say that no other business ever received less return for taxes paid than the lumbermen of the north central states. They have had little or no police protection; hunters and fishermen roam their lands at will and set fires when and where they please. They have had few roads, and no public improvements worth mentioning.

There should be no rigid laws providing that certain things must be done regardless of locality. The conditions often are very different in adjoining geographical townships. What is feasible in one county may prove otherwise in the next. It would seem as though able commissions, as far as possible non-political, clothed with the necessary authority could best handle this matter. Nothing must be done that will be such a burden upon the lumbermen that they will have any harder time meeting the ruinous competition of the manufacturers of yellow pine in the South. No benefit would accrue to the citizens of these lake states in that way. On the other hand, nothing must be done to stop the development of the farms that follow in the wake of the logger. How important this is may be seen in the fact that upper Michigan buys 95 per cent of what she eats. This great importation is due to the lack of developed farms, not because she can not grow more of her food supplies.

Experience has taught the forester that the best way to prevent fires from spreading is by clearing out paths or fire lines. It is possible that the clearing up of a strip of land a few rods wide between the slashings and the timber may help to keep fires within small areas. If that plan was adopted and the lumbermen were compelled to cut the tall dead timber of any variety for a certain distance back from the fire lines, at the same time they cut the sound trees, and a good system of patrol was put in force, I feel quite certain that large fires would be a thing of the past. The cleared lanes around slashings would make access to fires much easier than it is today. Fires are more easily prevented than stopped. If they do start get to them as soon as possible and put them out when they are small.

The meat of the nut is an active campaign on the part of every one to prevent fires and quick action if they start. In this matter an ounce of prevention is worth a pound of cure. The fuel is always on hand and always will be. No law can prevent its accumulation. It is necessary.

Nature takes care of this accumulation by decay, adding humus to the soil that will be needed by the farmer of tomorrow in his effort to feed the ever-increasing population. Very soon the clearing of land from which the timber has been cut will be entirely a problem for the homesteader or pioneer farmer, and not for the lumberman to solve. Cut-over lands suited for agriculture will not lie idle long in the future.

Let us make haste slowly. The only laws that can be of lasting value to us will be those the enforcement of which will not be hindered by politics. Laws passed on the impulse of the moment, urged by those with little or no practical knowledge of conditions, will be poor laws. In the opinion of many we have too many laws of that kind now. I can see no remedy for this unless gatherings similar to this one, at which all interested parties confer, are to become ever a more important part of our commercial and political life.

RAILWAYS AND FOREST PROTECTION

BY R. H. AISHTON,

VICE-PRESIDENT OF THE CHICAGO & NORTHWESTERN RAILWAY.

(An address delivered at the Lake States Conference, St. Paul, December 6.)

I HAVE been asked to prepare a paper on the interests of the railways in protecting forests. First, let us consider what are the interests of the railways in these three states represented in the conference, and through which these railways pass. In Minnesota there are, approximately, 33,400,000 acres of forest area; in Wisconsin, approximately, 20,300,000 acres of forest area, and in Michigan, approximately, 24,300,000, making a total in the three great states of 78,000,000 acres of forest that we are here to try to protect.

In Minnesota, located within the forest area alone, there are 2,000 miles of railway; in Wisconsin there are 2,300 miles, and in Michigan there are 2,200 miles, or in the three great states 7,500 miles, lying wholly within the forest area, and this does not include logging roads, double tracks, sidings, spurs or anything but main tracks.

In the operation of these railways, and used exclusively within this forested area, there are, in the state of Minnesota, in regular service, 350 locomotives; in Wisconsin, 450, and in Michigan, 530, or an approximate total of 1,330, employed regularly, and this does not take into account extra locomotives required for relief, shopping, or to meet emergencies or exigencies in business; and it is safe to say that to perform the service in the forested area in these states there are employed each year—at some period of the year or other—approximately 1,800 locomotives.

The magnitude of the traffic through these districts can probably be best indicated by the statements that in the forest area of Minnesota there are moving daily 126 passenger trains; in Wisconsin, 240, and in Michigan, 230, or a total of 596 passenger trains daily moving through some part or other of this forest area.

There are also operated daily through this forest area, in Minnesota, 250 freight trains; in Wisconsin, 340, and in Michigan, 350, or a total of 940 freight trains daily, all of which move through this forest district.

It is hardly necessary for me to call your attention to the fact that the railways are, and will be for years to come, the greatest single consumers of the products of this timber country, and furnish a ready market for the settlers, lumbermen, and for other interests, and they realize fully, I think, the benefits accruing to them through conservation of the remaining forest areas in these states lying right at their doors, and they also realize fully that for every dollar they pay for piling, posts, lumber or ties throughout this district a certain portion of it comes back to them necessarily through the cleaning up and cultivation of the country; the bringing in of an additional number of people who are capable of earning a livelihood, and for whom they must transport the necessities of life, and to whom they must look for their support.

From another standpoint: Minnesota, northern Wisconsin and Michigan forest country is today the most attractive fishing, hunting and summer resort territory left in this great country of ours and is tributary to the greatest centers of population in the country with the single exception of the Atlantic

seaboard. The railways, more than anybody else, appreciate the possibilities of the proper conservation, care and development of these areas, and that where they now carry people by the hundreds to these resorts they will soon be carrying them by the thousands with resulting benefit both to themselves and to the communities residing within these districts.

We have heard a great deal lately about the cost of living. With the wiping out of the tie, post and lumber supply through this northern lumber country, the effect on the maintenance cost to the railways, about which we have heard so much in the rate hearings lately, would be particularly disastrous.

We all remember the day when the northern limit of agriculture was about at Green Bay, Wis. Today we find, bordering the lakes, successful agriculture carried on right up to and beyond Lake Superior, and where formerly the forest held sway we find today prosperous and contented settlers improving the land, raising crops and sustaining not only themselves but the large communities incident to that territory. Had this territory been deforested through fires, the ability to get settlers to go in there would have been limited as, in a great many cases, even the soil itself is destroyed or rendered unfertile through fires passing over it, and the ability therefore to develop agriculturally is gone.

The question now occurs, what, with all their varied interests in the prevention of forest fires, have the railways done to prevent them? I know what the general practice has been.

First. Maintenance of a clean right of way, free from brush, stumps and rubbish.

Second. Co-operation with the fire wardens in keeping the right of way thoroughly cleaned up and burned off.

Third. Absolutely prohibiting the setting of fires by section men, or other employees, except during the winter months or under the direction or order of the fire warden.

Fourth. Installation of the very best and most approved netting in the front ends of locomotives, and constant investigation and experimenting into every new appliance that promises any relief from fire. In connection with this a very thorough system of inspection at terminals and record of the condition of netting, and arrangements for repairs of same when defective.

Fifth. During particularly dry periods the abandonment of freight service during daylight hours.

Sixth. When dry conditions prevail the establishment of patrol either behind trains moving through the district, or at points in close proximity to each other, to guard against fires starting on the right of way and all times maintaining section patrols.

Seventh. By instructing train crews and engine crews on the importance of avoiding every possibility of setting fires, and directing them when fire is found on the right of way, to stop their trains wherever practical and put it out. Or in cases where their own, or any other train, would be endangered by such steps, by leaving word with the first agent or section crew and having them start back all the help possible to put out the fire.

What further can the railways do? I am very frank to say that I do not know.

They believe that the protection of the forests now conserves the revenues of the railways in the future, and to many of the railways it means their future life and prosperity.

They believe that the protection of the forests may be bettered by more efficient control by the officers of the states over all the interests engaged in business in the timber areas.

They believe in taxation that will enable a well trained and efficient force to be organized and maintained in each state, and endowed with police powers for the protection of the forests.

They believe the interests are so great and so identical that settlers, lumbermen, manufacturers and railways, and every other interest should unite in a plan to which all can work, which would be harmful to no interest but beneficial to all.

THE LOST TRAIL

While the drizzle falls on the slimy pavement, swelling
 The yellow gutters' flow,
 And the ways are dense with the hosts of buying, selling,
 And hurrying to and fro,
 I know that out in the north the winds are crying
 Round the willowed shores of the long white lakes outlying,
 And the black pine woods where my old lost friends are dwelling,
 And the splendor of the snow.

I know that mysterious land of wood and river
 Where the half-breed hunters range,
 The snow wraiths dancing upon the hill slopes ever,
 The gray sun, low and strange,
 The bull moose skulking through windrow and through hollow,
 The creak and crunch of raquettes where the trackers follow,
 The dark spruce shades where the forest dreams forever,
 But never dreams of change.

A snowshoe track leads up from the swamp and over,
 Where the otter trappers passed,
 To the drifted winter hut in the hemlock cover
 That shields it from the blast;
 Are you there, Pierre, Gaultier, as when we together,
 Free in the face of the grim Canadian weather,
 Learned the changeless spell of the north to hold and love her,
 And to turn to her at the last?

The snowstorm blindly drives through the woods to smother
 The ancient trail I knew;
 The track we blazed is lost, and never other
 Has marked that blind way through;
 But the same great roar through the leagues of branches sweeping
 Wakes the desire of a homesick heart that has long been sleeping;
 Oh, dark north woods, wild love and ruthless mother,
 I call, I cry to you!

F. L. Pollock in the Atlantic, May, 1901.

THE PROTECTION OF FORESTS FROM FIRE

By HENRY S. GRAVES

FORESTER, UNITED STATES DEPARTMENT OF AGRICULTURE

Part V—Concluded from December Number

METHODS OF FIGHTING FIRES

THE principles of fighting forest fires are essentially the same as those recognized in fighting fires in cities. The following are of first importance: (1) Quick arrival at the fire; (2) an adequate force; (3) proper equipment; (4) a thorough organization of the fighting crew, and (5) skill in attacking and fighting fires.

Quick Access to Fires.

Quick access to fires is accomplished through the work of supervision and patrol in discovering fires before they have gained much headway, and by a well-developed system of communication through the forest by roads and trails.

An Adequate Force of Fighters.

A small fire may be put out by one man, but in extensive forests several hours may pass before the fire can be reached. It is important to secure an adequate force of men and to get them to the fire quickly. In a well-organized system of patrol the guard who discovers a fire communicates quickly to other guards and to headquarters by telephone, signal, or other means, and indicates the number of men he needs. It is essential that there be definite arrangements for securing a force of men in case of fire. This may be accomplished by co-operation with lumber or sawmill operators who employ forces of men, and through co-operation with local residents, or, in case of small tracts, through the co-operation of neighboring owners, each of whom agrees to assist his neighbor in case of fires. In some states there is a system of fire wardens. In case of fire, the fire warden may call upon residents to assist in extinguishing it. They are required by law to repair to the fire in case of call, and there is a small statutory compensation for services. In case of extensive forests co-operative arrangements should be made with every resident within the forest and with every user of the forest to assist in fighting fires. In most cases where lumbering is going on the men who are employed in the logging operations, at sawmills, in road construction, etc., will furnish a large force on occasion. Through an efficient system of co-operation it is possible to secure quickly a large force of fighters, and through this same system all the residents soon take an active interest in preventing fires from starting.

The co-operative fire protective associations in the Northwest, following the example of the Forest Service, have organized systems of patrol and are doing highly important work in suppressing forest fires in the white-pine regions of Idaho and Montana and the fir forests of Washington. These associations now include practically all of the large timber owners in the Northwest, and many small owners as well. The expense of maintaining a patrol during the dry season, of fighting fires, and of building trails and telephone lines to

assist in fire fighting is apportioned among the members of the association on an acreage basis.

Proper Equipment for Fighting Fires.

Just as in a city the efficiency of a fire service depends in large part on the equipment, so also in forest work it is essential that fire fighters be furnished with the proper tools and other equipment. The implements needed for fighting fires differ under different conditions. Wherever dirt can be used the men should be provided with long-handled shovels. If water is available, buckets should be provided, and, where possible, bucket pumps. Under most conditions it is desirable to have mattocks and iron rakes, and there should always be axes to aid in clearing brush or cutting through down timber and old tops.

These implements should be kept in a convenient place for use in fighting fires. Proper organization for fire protection includes an adequate equipment for the fire-fighting force. No matter how numerous or skilled the crew, the men are helpless without proper implements. In the protection of woodlots in settled regions every farmer who repairs to a fire usually takes his own shovel, rake, ax, or other implement. In the more remote forests under organized protection, the implements are usually provided by the ranger. A very good plan is to have caches at convenient points on the trails or at the lookout stations, containing fire-fighting tools. In some cases in the mountain regions tools are kept in a special pack outfit ready to be thrown upon horses and taken at once to the fire. Such special outfits usually include shovels, collapsible pails, axes, mattocks, ropes, and in some cases fire extinguishers, and a small quantity of provisions to enable fire fighters to camp out over night if necessary. Where there are good roads, as in the woodlot regions, special fire wagons have been used to advantage. (Pl. X, fig. 1.) These consist of an ordinary wagon of the Concord type, furnished with a complete equipment of tools, bucket pumps, fire extinguishers, water tanks or barrels, etc. The author has used on his own tract in Pennsylvania a crude fire wagon consisting of a two-seated buckboard provided with a special galvanized-iron water tank with a capacity of about 1½ barrels. The wagon is also equipped with two fire extinguishers, two bucket pumps, one-half dozen buckets, shovels, rakes, axes, and such other tools as are needed in fighting fires.

Organization of the Fighting Crew.

It is important that there be in charge of the fighting crew someone in authority to thoroughly organize the work. A small crew well organized can do much more effective work than a loosely organized large crew. One of the advantages of the fire-warden system adopted in a number of states is that the warden has authority not only to impress men to fight fire but to direct their work.

The efficiency of the fire-fighting crew depends very largely on their skill and experience, and particularly on the skill and experience of the man directing the work. It is not only a question of knowledge of how to assign each man where his work will be most effective, but there must be judgment exercised in determining the general method of attack. The character of the fire, the character of the forest, the condition of the atmosphere, the strength and direction of the wind, the rapidity with which the fire is running, and many other points have to be taken into consideration.

Methods of Fighting Surface Fires.

Small surface fires may often be beaten out. This is possible when the fire is burning chiefly in a dry leaf litter or short grass. Where there are tops



Plate X, Fig. 1

A FIRE WAGON



Plate X, Fig. 2

METHOD OF BEATING OUT A FIRE WITH THE AID OF WATER

or piles of dry brush, or the fire is burning through thick brush or undergrowth, beating is very difficult.

There are various devices for beating. A blanket, coat, or riding slicker is often used. A gunny sack is one of the best implements for beating, particularly if it can be wet from time to time. A handful of green brush serves also very well for a beating device. In beating out a fire, one strikes the fire with a sideways sweep, driving the flames and burning material back upon the burned ground. A direct stroke scatters the fire. (Pl. X, fig. 2.)

The best way to extinguish running surface fires is to throw sand upon the flames. This method is, of course, practicable only when the soil is fairly clear of rocks and loose enough for ready digging. In the plains of the Atlantic Coast, for example, the sand is so loose that it can be dug up and thrown on a fire almost anywhere. The fighting crews are equipped with long-handled shovels, and the sand is thrown along the line of fire. When the fire is running in the open woods, in pine needles, a single shovelful of sand, properly thrown, will extinguish over 10 feet of fire.

Loose loam is also very good, but not so effective as sand. Heavy soil which clods is difficult to manipulate. Frequently sand or loose loam can be dug up in spots, but it is too stony to secure it all along the line of fire. The fighters must then supplement the use of sand or earth with beating or other methods.

Where, on account of the accumulated débris, the flames are intermittently too severe for beating, water is used if available. Water usually has to be brought from some distance; it must therefore be used very economically. The best way is to deaden the flames by a little water, and then beat them out with a gunny sack or other device. Experience has shown that water may be most effectively applied by a hand spray pump. This pump throws a stream 20 or 30 feet and makes it possible to apply the water exactly where it is most needed. The pump can be purchased at prices varying from \$3 to \$4.50. They are extensively used by farmers in the Northeast. Collapsible pails are excellent for carrying water, because of their lightness and compactness. Ordinary metal water pails are commonly used by farmers, and are much cheaper than collapsible pails.

When water must be brought over mountain trails special water sacks are used, which can be slung on a pack saddle. Water kegs adapted to pack horses have been tried in Pennsylvania. Where there are passable roads water is hauled in barrels or in specially constructed tanks.

Patent fire extinguishers have also been used in fighting fires. These throw a stream of water from 15 to 20 feet. The stream is chemically charged, so that it is very effective in putting out flames which would be little affected by ordinary water. In practice a crew is provided with several extinguishers, a supply of water, and extra chemical charges. As soon as an extinguisher is emptied it is reloaded, so that there may be a continuous play along the line of fire. In case of an ordinary fire running through grass or leaf litter, one extinguisher will put out 200 feet of flame.

A very good method in fighting running surface fires, where there is not much slash, is to make a narrow trace in front of the fire by raking to one side the leaves and other litter. As soon as the fire reaches the trace it is checked and readily beaten out. Sometimes, on level land and in open woods, a furrow is plowed as an emergency fire line. (Pl. VII, fig. 2.) This same principle is used to check fires burning through young growth and brush where it is difficult to get at the flames. A narrow lane is cut through the brush ahead of the fire. This gives a space where the crew can work without hindrance. As soon as the fire approaches, it is attacked by all the crew with the various fighting devices with which they may be provided.

Sometimes the front of the fire is so fierce that it is impossible to meet it directly. One method under such circumstances is to direct the course of the fire. The attack is made on the sides near the front, separating the forward portion of the fire from the main wings. A part of the crew attacks the forward part and others run down and extinguish the wings. The front of the fire, attacked from the sides, is forced gradually and constantly into a narrower path. Usually the front can be directed toward some cleared space, road, pond, stream, swamp, or fire line, when it will be checked enough to admit of a direct front attack. Sometimes by this plan the front may be rapidly narrowed by working from the sides, until it is at last entirely extinguished. The plan of giving direction to the course of the fire has often been successfully carried out when the fighting crew is too small for a direct attack.

Methods of Fighting Ground Fires.

Ground fires, burning in the deep layer of organic matter, are exceedingly difficult to extinguish. If the layer of vegetable matter is not very deep, it is sometimes possible to put out the flames by water or sand. If the layer is deep, trenching is the only practical method of stopping the progress of the fire. In using this method of fighting ground fires, one judges the rapidity with which the fire is burning and then, at a proper distance away, digs a trench through the vegetable layer down to the mineral soil, using axes, mattocks, and shovels, as the particular case may require. Such a trench, which has a width at the bottom of one foot, will enable the fighters to stop an ordinary ground fire, especially if the work can be supplemented by the use of water or sand at the trench.

Methods of Fighting Crown Fires.

Crown fires are always accompanied by surface fires. Crown fires stop when there are no longer inflammable crowns through which the fire will run, or when there is no longer any material on the ground to carry the surface fire. An ordinary crown fire will jump a wide fire line, and many fires have been known to cross wide rivers, almost without check. In the mountains, a crown fire running up a slope is almost impossible to check.

Back Firing.

On level ground it is possible to stop crown fires by back firing, when the conditions are such as to make back firing possible at all. Thus in the pine forests of the Atlantic Coast crown fires are frequently checked by back firing. The back fire burns off the surface material, and thus in itself acts as a check to the crown fire, and, if the area burned by the back fire is large enough, will stop it in this way. At other times, when the back fire has been successfully started and is well under way, eating back against the wind, it is caught by the hot volume of air generated by the heat of the crown fire. The flames are then turned quickly toward the crown fire, and the meeting of the two lines of flame stops the advance of the fire.

When fires gain such headway that it is impossible to stop them by direct attack, no matter how numerous and efficient the crew or complete the equipment for fighting, back firing becomes the only means of stopping the fire. It should, however, be used only when it is absolutely necessary. One of the commonest mistakes in fighting fires is to overestimate the rapidity of the fire and the difficulty of putting it out. A forest fire is always a frightening spectacle, particularly if it is sweeping in the direction of one's own property. Men often become excited and start back fires when it is entirely unnecessary. Back firing necessarily involves deliberately burning over property. When

this belongs to another person and one's own forest seems in danger, there is a great temptation to sacrifice it.

A second principle in back firing is to burn over as small an area as possible. The counter fires are therefore set only as far ahead of the fire as is necessary to make them effective. Very often, however, there is only one point from which a back fire can safely be started, so that the fighters have no choice.

If it is found that a back fire is necessary, a favorable point is selected directly in front of the fire, from which to set the new fire. This must be a point where it is safe to start a back fire, such as a road, fire line, stream, or swamp. The leaves are ignited at points five feet to a rod apart for a distance not greater than the estimated width of the head of the fire. These small fires gradually meet and form a continuous line, eating back against the wind. A part of the crew is stationed across the road or other break from which the back fire is started and put out at once the small fires which may result from the sparks blown over from the back fire.

The meeting of the two fires stops at once the head of the main fire. It is usually possible then to attack the wings with the ordinary methods of fighting. It is necessary to attack the wings at once, particularly if there is a strong wind, for otherwise each wing of the old fire would soon form an independent fire with a well-developed head. It is necessary, also, that a number of men be stationed where the original fire and the back fire meet in order to extinguish smoldering fires in tops, logs, and other débris.

Patrol After a Fire is Extinguished.

A fire is never out until the last spark is extinguished. Often a log or snag will smolder unnoticed after the flames have apparently been conquered, only to break out afresh with a rising wind. After the fire-fighting crew has left the ground it is always well to assign at least one man to patrol the edges of the burned area until it is certain that the fire is entirely out. This may not be for several days.



PREVENTION OF FOREST FIRES IN MINNESOTA

By GEN. C. C. ANDREWS,

FORESTRY COMMISSIONER OF MINNESOTA.

(An address delivered at the Lake States Conference, December 6.)

IN THE past forty years deplorable calamities have occurred in the Lake States from forest fires. The proclamation of Gov. Fairchild stated that the loss of life in the forest fire of October, 1871, in Wisconsin was at least 1,000 and that 3,000 persons were left homeless. Private contributions for relief which had been received at the executive office alone up to the end of 1871 exceeded \$166,000, and the loss of property by the fire was estimated at \$3,000,000. Ten years later the fire in southeastern Michigan, September, 1881, caused by settlers burning brush, ran over 48 townships, burned to death 138 people, rendered hundreds of families homeless and destroyed over \$2,000,000 of property. The money and supplies contributed for relief exceeded a million dollars. By the forest fire near Phillips, Wisconsin, July, 1894, thirteen people perished. In the Hinckley, Minnesota, forest fire, September 1, 1894, 418 people perished and the relief furnished to 2,045 sufferers amounted to \$184,744.

At the time of the Hinckley fire Minnesota had a law making it a misdemeanor to set on forest or prairie land fire that endangered the property of another, but there was no particular system for its enforcement. The Hinckley disaster led to making town supervisors fire wardens with a central directing officer called chief fire warden, but since 1905, forestry commissioner, with the trivial expenditure by the state of only \$11,000 a year. Under this system and with an area of 18,000,000 acres where the pine had its home, with increasing risks from the activities of new settlements, logging and mineral industries, campers, tourists and hunters, and notwithstanding many dry seasons, the average annual loss by forest fires, according to fire wardens' reports during the thirteen years from and including 1895 to 1908, when the Chisholm fire occurred, was only \$30,000. During that period not only much property but several villages, schools, and many lives were saved by the efforts of fire wardens.

In the Chisholm fire no lives were lost. That fire was started by careless fishermen, ten miles away from Chisholm, in an unorganized township, and it is my firm opinion that the village of Chisholm would not have been destroyed but for the presence of abundant slashings in the path of the fire. Liberal contributions were made by private citizens for the sufferers in the Chisholm fire, as was recently done for the sufferers by the Baudette fire of this year. I hoped the Chisholm experience would have induced our legislature to be much more liberal than it had been with money for the prevention and suppression of such fires, but the only increase it made was \$9,000 a year, making \$21,000 annually for all purposes for the forestry commissioner's department. The weather the present year from April to November, proved exceptionally dry and dangerous. Twenty-six rangers were put on duty in June, but their service had to be dispensed with September 1st for lack of money. The Baudette fire in which 29 people perished and perhaps \$1,000,000 or more of property was destroyed, occurred October 7th. It was a tornado that made the fire so fatal. Mr. George Chapin, who had served two seasons as ranger in

that locality, in an investigation since the fire, assisted by Mr. Frank Curtis, a cruiser living in the region, found that the origin of the Baudette fire was from a combination of four fires that had been burning in swamps, three of which had been started by settlers and one by sparks from the railroad locomotive. It is probable that if there had been means for continuing ranger service in that locality the calamity would not have occurred.

We must remember that the forests of Minnesota are worth \$100,000,000 and that they increase in value by growth at the net rate of 2 per cent per annum or \$2,000,000 a year. The \$21,000 appropriated annually for protecting these forests from fire is scarcely enough for effective work in any one out of eight large counties requiring fire warden service. Minnesota has been criticised by the press of the entire country for its parsimony. A costly tuition has taught us that we must have more stringent laws for the prevention of fires, and more money for their enforcement. The careless use of fire that has been habitual in the forest regions of our northwestern states would not be permitted in a country like Germany.

A large per cent of forest fires are set by sparks from railroad locomotives. There are in Minnesota in round numbers 2,000 miles of railroads, including logging roads in the forest regions. Locomotives equipped with the best spark arresters will, on an up-grade with heavy train, emit sparks; hence our law of 1909 required railroad companies to employ patrols in "a dry season." Instead of complying with this, the law was contested by railroad companies and three district judges of the fifteenth district held that the words "dry season" were too indefinite and the law invalid. The prosecutor in criminal cases cannot appeal and the state has been unable to have the law construed by the Supreme Court. Our remedy must be to copy the New York law of 1909 which requires railroad companies operating in forest regions to maintain an efficient fire patrol from April 1st to November 1st, and if they fail to do so, then the state shall do it and the railroad companies pay for it. At present railroad companies pay in the aggregate large amounts for damages caused by fires they set. Forest fires discourage new settlers from going upon the vacant lands. It is for the best interest of such companies to take more pains than they have hitherto done for the prevention of such fires along their lines.

In 1905 I presented to the legislature a bill that had been drawn with the assistance of the best legal talent in St. Paul, providing that if those who cut wood and timber for commercial purposes did not burn the slashings the state would do it and the expense be a lien on their property; but the opposition to it was too strong. I firmly believe that if it had been passed and enforced, neither the Chisholm nor Baudette calamity would have occurred.

I presented evidence to the forestry committees of the last legislature that under the regulations of the Interior Department of the United States, slashings from winter logging in the Minnesota National Forest were successfully burned at the time of cutting; but at the earnest request of representatives of logging companies, the bill which I had prepared was amended to read: "Said burning shall be done as soon as practicable at a time when it can be done without danger and before the first day of May next following." But this law has not proved successful and it is necessary to enact a law requiring branches to be lopped from the tree and burned at the time of cutting by piling them upon a fire, where the logging is between November 1st and April 1st. All laws should be administered with common sense, and with a spirit of justice and it is to be hoped, in view of the sad experience we have had, timber producers generally will support such a law and give it a fair trial. There must be some spirit of sacrifice all around if we are to succeed in averting the terrible forest fires that discredit our civilization.

Every good citizen wishes to promote the welfare of the new settler who in good faith tries to make a home in the forest wilderness. The state in some localities has not yet done its duty towards such settlers nor promoted its own best interest in the matter of main roads. There is an almost overpowering temptation for many settlers whose land is incumbered with brush to set it on fire in very dry weather. The yielding to such a temptation, however, has caused many bad forest fires. Many a poor settler has lost all his hay by the over-confidence or negligence of a neighbor in the use of fire in dry weather. But there must be a change; and I recommend a provision of law that from April 15th to November 15th no one shall set fire to brush, stumps or meadows in the forest regions without first making a fire-break of bare earth a rod wide between the place of fire and the property of another, nor without first obtaining the consent of the town board.

The 26 rangers employed from June 1st to September 1st proved in most instances useful. They were successful in securing quite a number of prosecutions and convictions for violation of the forest fire laws. It is seldom a local warden is willing to prosecute a fellow townsman. There are 700 townships in which ranger or patrol service could be useful in very dry weather. If one ranger had charge of only ten townships it would require 100 rangers. The expense of adequate patrol and ranger service will be about \$100,000 a year. If we could find a George Washington in every township who would be willing to serve as fire warden or patrol, the problem of forest fires would be solved. Your ideal man who has the energy, courage, and honesty to make a thoroughly efficient ranger or patrol is not so easily found. It requires very good pay to secure the services of such a man. Of course all appointments in the forestry service should be solely for fitness and without regard to party adherence.

As town supervisors are frequently changed I believe it would be an improvement of our present system to appoint permanently in each town, as fast as we can find a suitable man, one warden or patrol to take the place of the three supervisors and town clerk, who now are ex-officio fire wardens. If we could find such a man in each town, then would arise the question of wages. If he paid his own expenses it would be necessary to pay him three dollars a day. Watching against fires in dangerous weather and enforcing the slashings law in winter might require sixty or more days of his time. A really valuable man for such duty would prefer to stick to his farm.

The forest fire laws will not be respected unless enforced. The state cannot keep a watchman over every heedless person in the forest regions. Examples must be made of those who violate the law so that others will be restrained from negligence in the use of fire. While there have been praiseworthy exceptions, as a rule the county attorneys have proved of but little help in prosecutions under the forest fire laws. The incapacity of local magistrates is an obstacle in securing convictions. The advantage of penalties being under \$100 is in having speedy trials before local magistrates. If the penalty were above \$100 the case would have to go into the district court and be attended with considerable delay. The present appropriation for prosecutions is \$2,000 a year. But it is not enough for any one of ten counties that could be mentioned. There should be an appropriation of at least \$25,000 a year for prosecutions. We must pay respectable men for promptly looking up evidence and capable attorneys for conducting prosecutions.

If the legislation indicated prevails it will require considerable additional office force to attend to correspondence and supervision incident to the ranger, patrol and warden service, watching that a thousand different firms or individuals live up to the slashings law, that 2,000 miles of railroad are patrolled and prosecutions instituted and carried on with energy against violators of the law. The forestry commissioner's office must be strongly reinforced, and not with cheap men.

EDITORIAL

THE STATUS OF THE WEEKS BILL

THE Weeks bill as it passed the House at the last session is unfinished business in the Senate and by unanimous consent is to be voted on, with any amendments that may be offered, on the fifteenth of February. The title of this bill describes it as a bill "to enable any state to co-operate with any other state or states, or with the United States, for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers."

The text of the bill is familiar to readers of *AMERICAN FORESTRY*. It passed the House on the 24th of June by a vote of 130 to 111. In the Senate its passage was prevented by a filibuster conducted by Senators Burton of Ohio, and Newlands of Nevada, the fact that Congress had determined upon adjournment, owing to the lateness of the season, the heat, and the pending political campaign, making the success of the filibuster possible, notwithstanding a large majority of the Senate would have voted for the passage of the bill.

The question of success or failure of this long-sought legislation, therefore, now lies in the upper house, and the fact that a rosy view of the prospect is held by many members of both houses, and that heretofore there has been a safe working majority in the Senate for bills designed to establish national forests in the Southern Appalachian and White Mountains, should not give us undue confidence, or lead us to relax our efforts in the least.

The situation is a critical one. We have been on the threshold of victory before, only to meet defeat in one way or another. The charge has been frequently made that neither house would pass the bill if some members did not have assurance that it would fail in the other house. We do not believe this. The fight in the last two Houses of Representatives has been a genuine battle and if the enemies of the bill in the House could have defeated it they would have done so. Nevertheless, the experience of weary years of hope deferred has taught us that nothing is certain at the Capitol until the votes are counted.

There has been but one test vote in the Senate for three years, the defeat of the bill having been twice due to hold-ups in the last days of the session. Last year on the question of making the bill unfinished business, the vote was 48 to 16. This vote roughly indicated the friends and opponents of the bill, although it was not a final division by any means.

The sixteen voting nay on that question are probably to be counted against the bill: Bailey of Texas, Bankhead of Alabama, Bourne of Oregon, Bristow of Kansas, Brown of Nebraska, Burton of Ohio, Crawford of South Dakota, Dick of Ohio, Gore of Oklahoma, Heyburn of Idaho, Hughes of Colorado, Jones of Washington, Newlands of Nevada, Paynter of Kentucky, Percy of Mississippi, Shively of Indiana.

It is probably correct to assume that on a straight vote the bill would pass the Senate, but it must be remembered that there are many shifts by which

opponents of a measure may block the game—even more under the open rules of the Senate than under the close rules of the House.

To friends of this measure we therefore say most emphatically: Take nothing for granted. Find out how your senators stand and if they are opposed to the bill, convert them if possible before the 15th of February. On that day we must have the votes to pass this bill, in such form that it will not be thrown into conference, or there will be little left to save in the White Mountains, at least, and a tremendous task of reforestation will have been created before another bill can have been put through the tortuous legislative channels.

There is danger in a conference because this is the short session. There is very little time between the 15th of February and the 4th of March, when this Congress expires by limitation, and all the tedious work of initiating and advancing the bill would have to be done over again. A conference offers an opportunity for the use of obstructive tactics again in the last days of the session. Senator Newlands announces his purpose to press his conservation commission amendment, and other amendments may be offered which would throw the bill into conference. They must not be passed. Let your senators know that the people of the eastern United States almost unanimously, and a large number of the best citizens of other sections want, not a mere perfunctory vote, but the immediate passage of a bill that can be put into effect.

This measure has been held up too long. It will return to trouble Congress until some satisfactory measure becomes a law. It has few opponents, but they are active. Its friends must continue their activity up to the moment when the bill goes to the President. Then, and then only, it will be safe.

THE LAKE STATES CONFERENCE

HERE is great promise in such gatherings as the Lake States Forest Fire Conference held last month in Saint Paul. It is probable that the era of great national congresses to deal with conservation subjects of which the American Forest Congress of 1905 under the auspices of the American Forestry Association was one of the first and the most fruitful, has reached its zenith. They have done their work of arousing the people, of bringing certain great questions into the full light of discussion and making them matters of popular interest. Outside of a few to whom such gatherings are a recreation, and of political leaders to whom they furnish an opportunity, people will not give much time to these crowded gatherings and over-crowded programs, but they will go a long way to discuss with men who know how to do them the things that they are now quite certain must be done.

Out of the assembling of such varied interests as met at Saint Paul, varied in their point of view but with that view focussed on the same object, will come real forest conservation and by and by real forest development. Why? Because every interest of our people, selfish and unselfish, looks to the same end, and as this is real life and not a debating society, the workers must get together and agree on a policy. Such a course is infinitely better economics and better politics than spending good energy in debating non-essentials.

Throughout the country the same spirit is making itself manifest in divers ways and the men in the far West who are fighting an alleged theory of nationalism that no one has really advanced, and the extreme nationalists who are tilting at a state rights doctrine that is not seriously held by any man of statesman's size in the United States, can profitably follow the general example and get together to work for the common good.

A STATE'S UPBUILDING

A LEADING article this month calls attention to the noteworthy development of forestry in New Hampshire, to which reference was made in our September issue, in connection with the meeting of the Society for the Protection of New Hampshire Forests. So marked has been this progress that it might almost be described as regeneration. More than forty years ago when everyone regarded our forests as inexhaustible and hardly anyone had begun to appreciate their protective and sanative values, the Granite State parted with the last of its mountain lands. At that time this was quite natural. Today it would be regarded as a crime. So far have we advanced in knowledge and lost in forest wealth.

Like most of the older and especially of the agricultural states, New Hampshire was slow to realize the consequence of its error and slower still to adopt a new policy. It happened also that there grew up within the state a type of politics which did not always serve the people well and which affected forestry and agriculture as well as all other interests of the state. Everything was dominated by the railroads and strange results followed.

The last few years have seen a change, striking and encouraging—the revolt against the railroad empire, as Mr. Churchill has named it, the struggle of good citizenship to assert itself, and a consequent revolution in many of the little strongholds of the old system. A very active part in this development has been played by the Society for the Protection of New Hampshire Forests. It is and has been wholly outside of politics, but its vigorous work has been on the side of good citizenship and of more intelligent and unselfish administration of the state's affairs. Through the men whose personal influence receives due credit in Mr. Brown's narrative, the forestry commission became vitalized into a big, aggressive force. Its leading member won his spurs in the commission and in the legislature and has been duly promoted to the governorship, and today the forestry movement is nowhere more active than in this old conservative commonwealth. It is suggestive to note through all this the intimate relationship between forestry and good citizenship.

It is a splendid record that the people of New Hampshire are making and they can no longer be charged with backwardness in this direction. With the national forests that must come in the White Mountains as a nucleus, we now look hopefully forward to seeing the state build around this a system of state forests and forests and mountain parks which will be objects of interested study by foresters and civic improvement advocates everywhere.

A SUGGESTION FOR FULLER STATISTICS

SOME months ago there was started on its round of misrepresentation one of those statements of fact which is so much more injurious than a falsehood. It was in the form of a table showing the total acreage of the states of California, Colorado, Idaho, Montana, Oregon and Washington, the "reserved acreage" (by which is meant the national forests) in each, and the percentage of the latter to the former, showing an average reservation in the six states of 26.9 per cent. This was used by the diligent newspaper opponents of the national forest system as a text for their attacks on that system, and it crops out from time to time in other journals farther east, being used to show that "conservation" is detrimental to the prosperity and civilization of the national forest states.

For example, a leading paper in Michigan took it up and pointed out that a proportionate reserved area in Michigan would amount to ten million acres

and could not be "taken out" of Michigan without destroying thousands of acres.

Nothing could be more absurd. Has Michigan any mountains like the Rockies, Sierras, Cascades, Olympics, or other Pacific ranges in which most of the national forests in the six states are located. If it had how many Michigan farms and homes would be found among them?

Again, the national forests are not "taken out" of a state. The land is simply devoted to its best uses—timber production and watershed protection. It is "reserved" only from private exploitation which would destroy it for the purposes indicated for it by the natural topography. This is true of the larger part of the acreage referred to.

We suggest that the anti-national forest statisticians devote a part of their efforts to a tabulation of the exact amount of land available for agriculture and settlement included in the reserves and then study the land laws and the practice of the Forest Service to determine how much of this is actually cut off from settlement. The imposing figures they now use would be materially diminished by such a study, and the study would serve a useful purpose in that it would correct misconceptions, instead of creating them.

CURRENT LITERATURE

REVIEWS

The Conservation of Natural Resources in the United States. By Charles Richard Van Hise. New York, Macmillan Company, 1910. Pages 413. Price, \$2.00

Dr. Van Hise's orderly statement and summary of the main facts and principles of conservation is exactly what is needed. The report of the Conservation Commission, from which he has drawn largely for facts, is not likely to be much used by the general reader or student. This volume, of about four hundred pages, makes a convenient manual for the special student or the average citizen. It contains the substance of twenty lectures given at the University of Wisconsin. Its purpose is to furnish a correlated statement of the essential information which an intelligent citizen might desire with reference to conservation. The author is probably as well fitted as any man in the country for this task by scientific knowledge, experience, and close study of the conservation movement in which he has taken an active part. He disclaims any attempt at originality and recognizes the impossibility of satisfying in a survey of this kind specialists in any of the branches treated. He must be given full benefit of these qualifying statements in any estimate of the book, for he has assumed a difficult, necessary, but rather thankless task and has done it well.

There is a brief introductory history of the conservation movement and here we

find it necessary to enter a slight criticism of incomplete and inadequate treatment. Dr. Van Hise recognizes the initial influence of the forestry movement in the development of the conservation idea, but he entirely overlooks the great work done in that field by the American Forestry Association since its organization in 1882. He gives the credit for bringing about the organization of a government bureau of forestry entirely to the American Association for the Advancement of Science and the National Academy of Sciences. The splendid work done by these bodies deserves all the praise that can be accorded them, but it is not entirely just to overlook the constant and effective work done through three decades by the first real conservation organization in the country, which has built up a national membership of several thousand, and is still doing an important work. The first really great national conservation congress was the American Forest Congress of 1905, held under the auspices of the American Forestry Association, when the Hon. James Wilson was its president and Gifford Pinchot the chairman of its executive committee.

Following the introduction, Part 1 deals with the mineral resources of the country, taking up successively coal, peat, petroleum and natural gas. The metallic resources—iron, copper, lead, zinc, gold, silver and the subordinate metals—are then treated. Part 2 deals with the important subject of water, its sources, amount, run-off, navigation and irrigation. Part 3 is devoted to forests and

discusses the original and existing forests, the consumption of the forest, and the various branches of this consumption. Part 4 treats of the land, taking up the soil, land classification, land ownership and farm lands. Part 5 discusses conservation and mankind, the principles of conservation, the purpose of conservation, the conservation of man himself, population and conservation and conservation and patriotism. The appendices contain the declaration of governors for the conservation of natural resources, the declaration of principles of the North American Conservation Conference, and the statement of principles of the National Conservation Association. From this brief outline of the principal heads, it may be seen how comprehensive is the book in its treatment. We shall not attempt any critical examination of the several sections. It is sufficient to say that they are probably the most authoritative brief statements of the subjects they cover that is now available in book form. There are sixteen plates, most of which are pictures of forestry subjects or of land conditions closely related to forest protection, and there are twenty maps and charts.

Finally, we should say that this book is one that should be in the library of every intelligent citizen who wishes to keep abreast of current topics.

The Boy With the United States Foresters. By Francis Rolt-Wheeler. With thirty-eight illustrations from photographs taken by the U. S. Forest Service. Boston, Lothrop, Lee & Shepard Company, 1910. Pages 317. Price, \$1.50

This book, the second in the United States Service series, is a boys' book on somewhat new lines and one of those that can be read by boys of any age from ten to seventy plus. Its obvious intent, to teach some of the elementary facts of forestry and especially of the conditions in the national forests, their relation to the people and their administration, is well carried out without making the book pedagogical, or interfering with the trend of the story. The latter is simple enough. It is an account of the experiences of a young fellow of the right kind who, as a preliminary to a higher technical education in forestry, entered the service of the United States as a forest guard. His experiences and adventures, which are typical of the life of national forest officers, form a chain of adventures that will hold the reader's attention to the end, and it will be strange if it does not make him love the Service and appreciate its task and its difficulties, as the author evidently intended his readers should. The note of purpose in the book, combined with an interesting narrative of real life adventures, makes it safe and wholesome reading for any normal boy.

Many things that need to be well understood are very well and plainly stated, as when the old ranger, a woodsman of long experience, says: "Once we had to fight tooth an' nail agin the forest jest to get enough land to live on, an' now we've got to fight jest as hard for the forest so as there'll be enough of it for what we need;" and again, when the supervisor, in reply to Wilbur's suggestion that the telephone seems to destroy some of the primitiveness of the forest, says: "You don't want to run into the mistake of thinking that life on a national forest is principally a picturesque performance. It's a business that the government is running for the benefit of the country at large. Anything that can be done to make it efficient is tremendously important. The telephone already has saved many a fearful night ride through bad places of the forest, has been the means of stopping many a fire, and has saved many a life in consequence. I think that's a little more important than 'primitiveness,' as you call it." We commend this straightforward statement to some of our congressmen who have under consideration appropriations for the improvement of the national forests.

MONTHLY LIST FOR DECEMBER, 1910

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NATIONAL FOREST WORK

The Harvest of Hickory

The Office of Wood Utilization of the Forest Service, United States Department of Agriculture, is co-operating with the National Hickory Association in a comprehensive investigation of the country's hickory problem. The annual cut of more than 300 million feet, exclusive of fuel, is well known, but it is not so well known what becomes of it, or whether it is all put to the best uses for which it is fitted. It is well understood that the country's hickory supply is limited. It probably does not exceed ten billion feet. This is really the world's supply, because the wood grows only in this country. Thirty-four states contribute, but two-thirds of the supply comes from half a dozen. It is one of the most important woods of this or any other country, and for a number of purposes no satisfactory substitute has been found for it. The need, therefore, of securing all possible information is apparent.

It is a wood so valuable for special uses that it ought not to take the place of common lumber, while it is not believed that a very large quantity is so used, yet there are no statistics showing where all the 200 million feet cut by ordinary sawmills goes. It ought to go to handle mills, carriage shops, and factories that demand it for special and exacting purposes, but it is not known that it all goes there. In fact, it is known that some—probably not much—makes crossties, fence posts, bridge plank, and other firm timbers. Such use of this valuable wood should not be encouraged. Dozens of cheap and plentiful woods give better service in such places, and it is the worst kind of economy to let good hickory be so diverted while it is in constant demand for carriages and handles.

The investigation will look into the use of hickory as fuel. It is one of the very best woods for that, but logs fit for buggy rims, ax handles, or sucker rods, should not go to the wood pile. The hickory lumberman should have first choice, and the firewood cutter ought to be satisfied with what is left. It is interesting to note that meat packers in many of the cities, and smaller towns as well, prefer hickory to all other woods for smoking meat, and large quantities are so used. This matter will be included in the investigation, and the demands of packers for smokewood will be considered. Doubtless they can use rough and knotty wood as well as the fine grades, and would not insist on clear, straight grained hickory for their smokehouses, if inferior grades were available. Hickory knots ought to make as good smoke as hickory ax handle stock.

It has been asserted that the waste of hickory in the woods and at the mill is unnecessarily large, but the assertion has been strongly denied. Perhaps similar conditions do not exist in different regions. A thorough investigation of this phase of the question is under way, and it will be carried out by field work in four typical hickory states, Missouri, Mississippi, Louisiana and North Carolina, and by correspondence in twelve other states.

When all obtainable facts relating to cutting, manufacturing, and marketing hickory have been collected, together with the uses to which it is put, the information will be made available to the thousands of owners, manufacturers, and users of this valuable wood in all parts of the country, and it is believed that the information will assist them in turning every stick to the best possible account.

An Active Planting Campaign

Associate Forester Potter is quoted as authority for the statement that as many new trees will be planted under the direction of the Forest Service in the national forests during the fiscal year as were set out during the past five years combined. This is the beginning of a plan to increase as much as possible each year the number set out. The seeds which provide nursery stock are planted in the fall of the year, while the nursery stock is set out both in the fall and in the spring. The elimination of certain areas from national forests because they have been found to be more valuable for agriculture than for forestry, and the addition to the reserves of certain parts of the public domain considered more adaptable for forestry purposes, have been practically completed, and now that the permanent boundaries of the reserves are better known there will be increased activity in setting out new stock.

The Work in Florida

Raphael Zon, chief of sylvics, and Theodore S. Woolsey, assistant district forester, have been in Florida, studying the situation there with reference to the Choctawhatchee and Ocala national forests, and the possibility of growing eucalyptus in Florida. Their presence seems to have aroused much interest. The *Tampa Times*, of December 6, reports their arrival in that city to examine the five-acre tract of land which was donated by the Mutual Realty and Investment Company to the government for the purpose of conducting experiments with eucalyptus trees. This matter was in charge of the local board of trade.

It is estimated, says the *Times*, that several thousand trees will be planted on the tract. Messrs. Zon and Eldridge came here from Pensacola, where they have been conducting a similar investigation.

Florida papers say that Mr. Zon already entertains a high opinion of the Florida territories, and is of the opinion that both the Choctawhatchee and the Ocala forests offer excellent opportunities for forest planting, its success depending largely on the proper choice of species and the general preparedness when the time comes for planting. Florida seems well supplied in its own kind of species, and it is intended to take advantage of these in all cases of reforestation and in the planting of new and virgin areas. In the Ocala forest it is thought that maritime pine, cork oak and loblolly pine will do well, while in the southernmost part of that forest the eucalyptus will adapt itself very readily to the conditions.

When it comes to the planting of seed for trees, there are a number of obstacles to overcome and hindrances to offset in order to assure anything like successful results. Should the territory be the habitat of the rodent family, the chipmunk, ground squirrel, gopher and the like, all seed beds are liable to serious damage and

depletions. While every precaution is usually taken to protect the beds as far as possible, some one or more of the enumerated pests are sure to make serious inroads, and in a short time will destroy the better part of the plant.

Boundary Changes

The following recent additions to, and eliminations from, the national forests have been announced. In all cases unappropriated lands that have been eliminated are restored to entry and settlement:

Forest	State	Add. acres	Elim. acres
Apache.....	Arizona.....		70,376
Crook.....	Arizona.....	149,800	4,480
Prescott.....	Arizona.....	132,825	81,081
Sitgreaves.....	Arizona.....	23,966	68,415
Tonto.....	Arizona.....		7,040
Arkansas.....	Arkansas.....		400,911
Stanislaus.....	California.....	6,870	3,084
California.....	California.....	4,784	58,732
Arapahoe.....	Colorado.....		2,561
Routt.....	Colorado.....		101,602
Toiyabe.....	Nevada.....	311,793	65,755
Wichita.....	Oklahoma.....	1,204	360
Ashley.....	Utah.....	2,540	
Powell.....	Utah.....	27,409	55,680
Uintah.....	Utah.....	37,205	
Chelan.....	Washington.....		17,610
		698,496	937,687

STATE WORK

The Massachusetts Forestry Association

The annual meeting of the Massachusetts Forestry Association was held in Boston on the 15th of December. Nathaniel T. Kidder of Milton, was reelected president; Irving T. Guild of Arlington, secretary; and Ernest B. Dane of Brookline, treasurer. Frederick B. Knapp of Duxbury, and Edward S. Bryant of Boston, were elected members of the executive committee for three years. The vice-presidents, one from each county of the state, were reelected. The treasurer's statement showed receipts of \$2,820.64, and expenditures of \$3,059.78, with a balance on hand of \$724.61. The permanent fund amounts to \$11,217.87, and yielded last year an income of \$552.14.

Owing to local conditions and needs, the association specialized somewhat in its work for the year upon the city shade tree problem. Efforts by it and other organizations resulted in the preparation of a shade tree ordinance for the city of Boston, which is considered as complete as that of any city in the country. Newark, Providence, Cleveland and Chicago are now in the lead with shade tree legislation, but Boston, if it passes the new ordinance, will have profited by their experience. The association also shared in promoting several local tree planting enterprises and secured the pas-

sage through the legislature of a law providing that in case the boundary of a highway is for any reason uncertain and consequently the right of a city or town to enforce jurisdiction over any given roadside tree is disputed by an abutting property owner on the ground that it is not within the highway limits, it is necessary for the property owner to prove in court his ownership of the tree, otherwise it shall be taken to be in the highway. The amendment also amplified the definition of a public shade tree as not only one which stands within the limits of the highway, as the law has previously defined it, but also includes trees which stand upon the boundary line.

Another law which was successfully advocated by the association extends to city officers having the care of shade trees all the powers and duties now conferred upon the tree wardens of towns.

The proposal to amend the state constitution to permit classification of property for taxation was again before the legislature during the past session, and the association advocated this change on account of its effect upon forest taxation. No result has yet been reached.

Among state laws which were passed at the instance of the state forester, were: (1) An act prohibiting the liberating or

flying of fire balloons anywhere within the state, carrying a penalty of a fine not exceeding one hundred dollars, or of imprisonment not exceeding one month, or both; (2) A provision by which the state forester may reimburse towns for fifty per cent of their expenditures in preventing and extinguishing forest fire or for making protective belts or zones as a preventive against forest fires, no such reimbursements to exceed \$250; (3) A provision by which the state forester, with the approval of the governor and council, is authorized to accept bequests or gifts to be used for the purpose of advancing the forestry interests of the commonwealth.

New Hampshire Timberland Owners Meet

A meeting of the large timberland owners of the state was held at Gorham, New Hampshire, December 15th, for the purpose of perfecting their association for fire protection and general co-operation. The firms represented were International Paper Company, Berlin Mills Company, Conway Company, Publishers Paper Company, Connecticut Valley Lumber Company, Coe & Pingree Estate, Odell Manufacturing Company, Livermore Mills Company, Champlain Realty Company, Geo. M. Blanchard & Son Co., E. Libby & Sons Co., C. M. C. Twitchell Estate, Sinclair-Stahl Company, A. M. Stahl, Pike Manufacturing Company, H. B. Hinman Estate, Dartmouth College Grant, Johnson Lumber Company, Bretton Woods Hotel Company, Balsams Hotel Company, Profile Hotel Company.

Addresses on the work already accomplished by the association in the way of establishing a large number of mountain fire lookout stations throughout the state, and the proposed protection work for the coming year were given by W. R. Brown, of the New Hampshire Forestry Commission, and E. C. Hirst, State Forester.

The officers elected were W. R. Brown, of the Berlin Mills Company, president; W. H. Bundy, of the Conway Company, vice-president; George S. Lewis, of the Connecticut Valley Lumber Company, Frank P. Thomas, of the International Paper Company, and Charles C. Wilson, of the Odell Manufacturing Company, to form a directorship together with the president and vice-president, of five members. Three committees were appointed—fire protective, legislative and auditing. It was voted to hire a forester and work in co-operation with the state.

Over a million acres were represented at this meeting, and a maximum assessment of one cent per acre per year was voted to carry on the work. Membership is desired of all timberland owners in the state. The office of the association will be at Gorham, N. H.

Pennsylvania Forestry Association

At the annual meeting of the Pennsylvania Forestry Association in Philadelphia, on the 12th of December, Dr. Joseph T. Rothrock, its secretary, recommended the opening of the state forest reserves to limited cattle grazing, hunting and fishing, and to parties of campers and health seekers.

In his annual report to the association, President John Birkinbine urged that politics be kept out of the forestry movement and deplored the division of conservation advocates on the question of national or state control, declaring that the forestry movement needs no political slogan to make it important.

The law committee of the association is now at work on a bill to revise the system of taxing forests, which it is hoped to bring before the next session of the Pennsylvania legislature.

The following officers and a council at large, representing the counties of the state, were elected: President, John Birkinbine; vice-presidents, William S. Harvey, James C. Haydon, Alfred Lewis; general secretary, Dr. Joseph T. Rothrock; recording secretary, F. L. Bitler; treasurer, Charles E. Pancoast.

West Virginia

While fires are the most destructive enemy to the large forests of West Virginia, the loss sustained in this state from rot and depreciation of debris runs into millions of dollars. But few of the lumbermen of this state are getting from the forests what should be gotten, fully 30 per cent of the tree being left in the forest to rot and decay. Men interested in the lumber business of West Virginia will seek at the coming session of the legislature to secure better protective forest laws, according to the *Wheeling Intelligencer*, which estimates the loss from rot and depreciation of debris as second only to that from fire.

During the year which is now rapidly drawing to a close the destruction of forests in West Virginia by fires, will be the smallest in recent years. This fact is largely attributed to the establishment of a forest, game and fish department. It is estimated that fully \$2,000,000 was saved during the year just closing at a cost of a little over \$1,500. The present administration has accomplished many things that have proven of great benefit to the forests, but the work has only just started. The requirement of spark-arresters on all railroad trains used in the woods, was an important step in the matter of saving the forests. The prohibiting of the building of fires through the woods and other laws have helped the tree.

With but few exceptions the lumbermen pay no attention to their pulp wood and leave it to rot in the woods, while others pay no attention to their slabs. It is estimated by lumbermen that the waste in slab wood alone in West Virginia, for the past five years, will exceed a million dollars a year. Efforts have now been made to prevent this loss and a number of the lumbermen

are placing their slab wood on the market with good results. West Virginia is one of the largest lumber producing states in the east and her revenue from timber reaches many millions each year. Unless the legislature continues the fight against the destruction of the forests it will only be a matter of a few years until this state will have but a limited supply of timber.

NEWS AND NOTES

Canadian Forestry Convention

Sir Wilfred Laurier, the premier of Canada, has issued an official summons for a Dominion forestry convention, to be held in Quebec January 18-20, 1911, and notices have been issued by James Lawler, secretary of the Canadian Forestry Association, which will have charge of the arrangements. The governor general will open the convention and the president of the association, Hon. W. C. Edwards, will occupy the chair. Among those who, it is hoped, will take part in the convention, in addition to official representatives, are Sir Wilfrid Laurier, Mr. R. L. Borden, M. P., Hon. Clifford Sifton, chairman of the Commission of Conservation; Hon. Sydney Fisher, Hon. Frank Oliver, Sir Lomer Gouin, Hon. Jules Allard, Hon. Frank Cochrane, Hon. W. C. H. Grimmer, His Grace Mgr. Begin, Archbishop of Quebec; R. H. Campbell, Dominion Superintendent of Forestry; H. S. Graves, Chief Forester of the United States; Dr. H. S. Beland, M. P.; Dr. B. E. Fernow, Dean of the Faculty of Forestry of the University of Toronto; Achille Bergevin, of the Quebec Fish and Game Protective Association; and Dr. C. Gordon Hewitt, Dominion Entomologist. The Legislature of Quebec will be in session, and the Commission of Conservation will hold its annual meeting in Quebec on Jan. 17.

This convention will have much the same breadth and scope as the American Forest Congress of 1905, and an invitation to participate has been extended to representatives of the United States Forest Service, the American Forestry Association, the National Conservation Association, and state forestry bureaus and associations.

The Use of Poles in 1909

The total number of poles reported to the Bureau of Census as purchased during the calendar year 1909 by the telegraph and telephone companies, steam and electric light and power companies of the United States was 3,739,000, as against 3,249,000 in 1908 and 3,283,000 in 1907. There were purchased in 1909 by the same class of users 3,509,000 cross-arms, 6,168,000

brackets, and 18,463,000 insulator pins. Cross-arms, brackets, and insulator pins were not included in the annual census of lumber and timber products prior to 1909.

Telephone and telegraph companies reported purchases during 1909 of 2,916,000 poles, or 78 per cent of the total, an increase over 1908 of 354,000 poles, or 14 per cent, and over 1907 of 604,000 poles, or 26 per cent. Steam railroads reported the purchase of 26 per cent more poles in 1909 than in 1908, though 34 per cent less than in 1907, while the reported purchases by electric railroads and electric light and power companies were 18 per cent greater than in 1908 and 7 per cent less than in 1907.

The average cost per pole of all lengths and from all species of wood in 1909, was \$1.89, as against \$1.82 in 1908, and \$2.46 in 1907, mainly for the reason that a class of pole consumers in the United States which uses chiefly short poles was not included in the census for 1907.

Cedar continues to be the principal pole timber, contributing 65 per cent of the total. Chestnut stands second, oak third, and pine fourth, these being the only species of which more than one hundred thousand were used.

Substantial progress in the practice of treating poles with chemicals to preserve them from decay is disclosed by the returns for 1909, nearly one-sixth of the total purchases during that year having been given some preservative treatment, as against about one-tenth in 1908 and one-eighth in 1907.

The Appalachian Forest Bill

The status and importance of the Appalachian forest reservation project is compactly presented in an editorial in *Collier's Weekly*, reproduced on this page.

The measure, which has passed the house, comes up before the senate for final disposition on February 15, 1911.

It is needless to emphasize to readers of *The Constitution* the meaning and urgency of the bill.

It merely aims to attempt some systematic preservation of the mountain forest

lands which have a controlling influence on the navigability of streams in the Appalachian district, and, what is of even greater importance, on the continued fertility and freedom from erosion of southern farm lands.

This is, of course, not to mention the tremendous stake of preservation of water power which, in its way, holds one of the keys to the future development of the southern states.

It will be an excellent idea for southerners to communicate their wishes to southern senators, and to keep a keen eye on the proceedings of the upper chamber on February 15, 1911.—*Atlanta Constitution*.

At least, it is to be hoped that the senate will pass the Appalachian forest bill, authorizing the government and the states to take action toward conservation of water and protection against floods. It is a special order in the senate for Feb. 15, having already passed the house, and it should be adopted.—*Duluth Herald*.

Industries to Utilize Forest Waste

The Washington Conservation Association is planning an active campaign to bring into the state industries to utilize forest waste. This will be worked out along the lines of a plan prepared by the secretary of the association, R. W. Douglas. The immediate aim is to attract outside capital and men of experience to locate in the state to develop the secondary wood and wood by-products industries.

The plan, says the *Seattle Post-Intelligencer*, contemplates the creation of a central organization under the direction of an intelligent head of unusual business ability. It is proposed that this man devote his efforts to presenting the opportunities in secondary wood uses in Washington throughout the East, and that the principal industrial centers of the state through their commercial organizations direct their energies toward securing plants for their communities.

Mr. Douglas has prepared a list of nearly 500 articles which can be made in this state from the lumber now wasted. There are, he says, hundreds of others.

"Of all the trees cut down," says Mr. Douglas, "only a little more than one-third of their material reaches the market. A large proportion of the inferior wood sacrificed could be utilized in a practical and profitable manner.

"Men of capital can be induced to establish in this state industrial plants similar to those operated in other states, notably Massachusetts, Michigan and Wisconsin, for the secondary uses of wood and the extraction of by-products from our inferior wood and waste.

Mr. Douglas states that some of the waste lumber that can be utilized consists of windfalls, fire-scarred trees, decaying trees, stumps, bark, limbs, branches, tops, slabs, spalts, back ends, edgings, unused short lengths, unmarketable low grades of lumber, sawdust, shavings, chips and drift logs and boards, found on all beaches.

The Forests of Labrador

Official reports to the Newfoundland government of reconnaissances in Labrador show that the country is heavily wooded, and that in Hamilton Inlet, Sandwich Bay, and other districts on the east coast there is good timber and great water powers, while the region, being open to navigation for seven months of the year, possesses the same advantages for the pulp and paper industry as the mills in those parts of northern Europe which supply European centers today.

In Groswater Bay, or Hamilton Inlet, is one property of 4,500 square miles, or half as large again as the tract possessed by the Harmsworths at Grand Falls, Newfoundland. Adjoining it is a second area of 1,200 square miles and a third of 600 square miles. All are well wooded and conveniently situated on the shores of this vast inland sea. Some distance south, adjoining these areas and having an outlet at Sandwich Bay, are areas equally well wooded of 1,200 square miles.

Missouri's Forest Resources

Last year, says the *Drovers Telegram*, Missouri placed nearly \$25,000,000 worth of lumber and other forest products on the market, but it is not maintaining its capabilities in that line. A supervisor of the Arkansas National Forest recently called attention to this. According to this authority the timbered area of the state dropped from 60 per cent of the entire area of the state in 1900 to 39 per cent in 1908. Less than five billion board feet now remain and at the present rate of consumption this will last but a few years more. The standing pine timber of Missouri is already practically used up. There are millions of acres of soils in Missouri that are worthless for agricultural purposes, but capable of growing valuable forest trees. These should be utilized for the growing of forest trees, and not allowed to grow worthless bushes and scrub trees. Were those recommendations followed Missouri would, in time, be growing more lumber and utilizing its soil economically. She is not the only state that needs to produce more timber. The entire country needs more.—*Hannibal (Mo.) Post*.

AMERICAN FORESTRY ASSOCIATION

THIRTIETH ANNUAL MEETING

WASHINGTON, D. C. *January 12 and 13, 1911.*

The thirtieth annual meeting of The American Forestry Association will be held on Thursday and Friday, January 12th and 13th, 1911, at the New Willard Hotel, Washington, D. C.

The usual annual business will be transacted: Reports of the Treasurer and Secretary, election of officers, and any other business that may properly come before the meeting.

Thursday morning there will be a meeting of the Board of Directors and registration of members.

For information and registration prior to two o'clock Thursday, members will call at the office of the Association in the Maryland Building, 1410 H Street, Northwest.

Thursday afternoon there will be a business session at the Willard, and brief addresses.

Friday morning the subject of discussion will be the proposed Appalachian national forest legislation. Speakers to be announced.

Friday afternoon will be kept open for conferences and committees, including a meeting of the Advisory Board.

Friday evening the annual dinner will be held at the Willard. A special notice of this has been sent to the members and their attendance is cordially desired.

IMPORTANT NOTICE TO MEMBERS

Members of The American Forestry Association have been informed through this magazine of the new arrangement by which membership in the Association does not include the magazine as heretofore. The dues for annual membership were accordingly made one dollar instead of two dollars at the last annual meeting, the subscription to the magazine being two dollars. This arrangement was made necessary by a ruling of the Post Office Department in regard to rights of entry for AMERICAN FORESTRY as second-class mail matter. The new arrangement has been in operation during the year 1910 as regards new members, but did not affect those who had already received their bills for 1910 under the old plan. There are these options under the new plan: Membership with or without subscription to AMERICAN FORESTRY, or subscription to AMERICAN FORESTRY with or without membership in the Association.

We earnestly hope all of our members will retain both membership and subscription. The former will maintain their connection with a great movement which is constantly gaining in importance. The latter will give them their money's worth. AMERICAN FORESTRY has entered upon the most useful period of its career. Its work is well defined, its position is generally recognized, and it commands the best work of the authorities on forestry. It occupies its field alone and it is one of the magazines of authority that the man or woman who wishes to be well informed on public questions cannot afford not to read.

The Appalachian Forests
Wardens of the waters that go
down to the sea
Nurseries of timber for sixty mil-
lion people
Breederers of men of strong old
stock
Givers of life and health and vigor
They must be saved to the nation



SOUTHERN APPALACHIAN FORESTS

ORIGINAL FOREST IN TRANSYLVANIA
COUNTY, NORTH CAROLINA

American Forestry

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No. 2

PRESENT FORESTRY ISSUES

By HON. CURTIS GUILD, JR.

(The President's Address at the Thirtieth Annual Meeting of the American Forestry Association.)

THE preservation of the trees is a portion of the programme of progressive legislation which has at last secured an almost universal grip upon the minds of the American people. Two years ago at the Indianapolis convention some of us were daring enough to propose an impartial tariff commission for the regulation of the details of tariff schedules. It was supposed that such a result would take years and years of patient effort. We now are actually on the verge of accomplishing the greatest reform in tariff legislation that has been known in the United States in a hundred years, and it is coming true within three years after the first agitation of the matter.

In similar fashion, another progressive policy, the preservation of the trees, and through the preservation of the trees conservation of water power and water supply, is daily gaining in its grip on the popular mind and the popular imagination, and is going forward with the rest of the progressive programme of legislation. The national government is giving it more and more attention, and we are particularly fortunate that we have at the head of that great bureau here in Washington so capable and competent and tactful a person as Mr. Graves, the United States Forester. You heard him relate yesterday how every cloud has its silver lining. Even the terrible forest fires of the West in this last year have not been without their benefits in calling the attention of the nation to the needs of tree conservation and in procuring proper patrols and proper guards against forest fires in the very district where forest fires have been such a curse in the past. The efforts of a friendly national administration are being seconded by the steady growth in one state after another of state boards of forestry or forestry commissions or state foresters. An increasing amount of land is being rescued through those agencies, and not merely are existing trees preserved, but new districts are being reforested.

Mr. Rane, from my own Commonwealth of Massachusetts, has spoken to you of a beneficent measure, which is bringing hundreds of acres of land under state control. The farmer is allowed to surrender his land, his waste land, to the state government of Massachusetts, which takes that land, plants it with the kind of trees that the soil is best fitted to raise, keeps it for a term

of, say ten years, and then returns it to the farmer with a forest in existence on what was barren land. The farmer pays simply the cost to the state of raising his forest. That is merely one example of what is being done, not only in one state, but in many states.

Furthermore, many cities are creating forest reserves. You heard yesterday how one great railroad, the Pennsylvania Railroad, is, by its own private enterprise, creating new forest preserves, and not merely saving the forests but cultivating the forests under scientific supervision. What is being done by nation, by commonwealth and by city—and there are even some small towns, like Westfield, Massachusetts, that have private town reserves, and the increase of parks is doing very much—what is being done, I say, by nation, by commonwealth, by city, by corporations and by individuals can be very much supplemented by our institutions of learning. I wish very much that the other colleges of the United States would follow along the path where Lehigh University has paved the way. Lehigh, up there in the hills of Pennsylvania, has a series of lecture courses open to the public. It undertakes to maintain no special forest school but it is a center of information on the subject of forest preservation and forestry construction. All the district round about, all the citizens in that neighborhood, are carefully informed, and their enthusiasm kept alive by the efforts of our friend of forestry, Dr. Drinker, and by the able faculty which co-operates with him, in spreading such useful and patriotic knowledge among their fellow citizens in that part of the country.

Not merely the colleges that maintain forest schools, like Yale and Harvard, but every college, every high school can be a center for the dissemination of this knowledge for the common good and the common country and for the making of our national life happier and better here in the United States of America.

What one feature of daily life can conduce more than the forest and the tree, whether in a forest or not, to human happiness? The tremendous sacrifice, loss and waste which has been made in this direction in the last ten years, is pretty well evidenced by the barometer of human comfort, the cost of the necessities of life. Our reckless policy in regard to the forest, and the neglect of conservation by Congress, has cost the people of the United States millions of dollars in every retail purchase they make. The cost of all kinds of lumber—look at the market reports—has increased one hundred per cent in fifteen years. Every kind of wood has advanced in price. There is no one article which enters into the cost of living which has been so advanced in cost to the people as wood and timber and the products of the forest, as a direct result, not merely of the wasteful methods of the private owners of forests, but as a result of neglect of national forest reserves by the national government. When we ask to have the passage of a bill conserving the forests, we ask also to have the national government help us to keep down the price of that particular necessity of life, which has advanced more highly than any other one in the entire list.

I use, of course, more illustrations from my own commonwealth, because that is the one that is the most familiar to me, and where I can speak with absolute exactness and authority. Massachusetts in area is fifth from the bottom of all the states in the American Union. As far as wood manufacture is concerned, we stand very nearly at the foot of the list. We have something to say when the manufacture of cotton, or the manufacture of wool, or the manufacture of leather, or the manufacture of rubber, or the manufacture of boots or shoes, or the manufacture of cotton machinery is concerned; but Massachusetts cannot brag of her wood working industries—we are almost

at the foot of the list. Yet Massachusetts, almost at the foot of the list in wood working industries, consumes five hundred and fifty million feet a year of wood.

The universal use of wood, the way in which it enters into every part of our lives is scarcely appreciated. As I have said before, the advance in cost of no one natural product has so contributed to advance the cost of living as the advance in wood and timber, the direct result of the reckless policy of the government and the reckless practice of the people.

Wood! the furniture which we use every day is made of it; houses are constructed of it; the boats which we use in our pleasure as well as those which we use still in the coastwise traffic and in the fishing trade are constructed of it. It enters into every single branch of transportation. The cost of wood used in the cars and the ships which carry the freight is added ultimately to the retail price of the commodities transported. Wood is used in every possible way. The substitution of individual paper cups for tin dippers at the public fountains means just so many more trees to be cut down. The making of matches, the splinters with which we light the fire, the making of lead pencils, is terrible in the destruction of even the smallest sprout that can be made to grow. The paper industry has learned how to conserve the forest tracts which are controlled by them, and to thin them out in many cases scientifically. It is not too much to say that some of the best friends we have are the paper manufacturers controlling large tracts of timber who understand the necessity of conservation. They cannot move their plants. They must conserve an annual crop. The match manufacturer, the pencil maker, does not leave even a piece of wood as large as a pencil point growing on any piece of land over which he gets control.

Did you ever stop to think how the price of the package is added to the price of the commodity which it contains? The doubling of the price of wood adds to the price of every commodity by increasing the cost of the package. Your gingham, your dry goods, your cottons and woollens are packed in wooden boxes, and the cost of that package has been doubled by the increase of the cost of wood. Your butter and eggs go to the market in packages of wood; your fruits, your vegetables, are packed in a square market box, made of wood; and in the case of almost every commodity of use wooden packages form a part of the completed product, and by the destruction of the forest we thereby raise, not one branch of the cost of living, but by increasing the cost of the package we raise every part of the cost of living.

It is against that policy that this association is fighting, has fought, and proposes to fight. It should appeal more largely than it does to the American people, from the point of view of financial support.

It cannot be too often insisted upon that while our present policy is destructive and wasteful, the opposite—the conservation policy—may be made not merely helpful but profitable. I need scarcely remind this audience that there are certain towns in Sweden, as well as many towns in the old Schwarzwald in Germany, that pay their entire town taxes out of the product of the local town forests owned by the municipality. Their forests have existed for hundreds and hundreds of years, carefully thinned out year after year, treated scientifically, and bringing in an annual profit. Scientific forestry is profitable today in the oldest parts of the world, much greater than in certain parts of the United States, where "the forest primeval, the shade of the pines and the hemlocks" has disappeared, and through the erosion of the soil in many places has disappeared forever. We have to think not merely of the loss of the timber that once was, but on the slopes of mountains, by the reckless cutting of timber, the loss of soil from erosion, which prevents any future timber from being grown there. Aside from the needs of

wood and of wood supplies that are furnished by the forests, the question of the conservation of the forest would be justified if only as a conserver of water.

We do not claim, we never have claimed, that the existence of a forest encourages rain fall. There is very good scientific authority for believing that the existence of trees does encourage precipitation, but the question is a disputed one among scientists; and we never have claimed that the existence of a forest would make more rain fall in any one place, though it is possible that it does. We do claim that after the snow or rain has fallen, the forest conserves the supply of water, thus regulating the stream flow, making it more even and regular, and prevents freshets in the spring and drought in the fall. The humus, the collection of leaves and soil at the foot of the trees, is absolutely the most perfect sponge for the conservation of moisture. The branches and the leaves of the trees hold the snow off the ground and it gradually drops from a height to the ground instead of falling at once, melting, and then rushing out to the sea. I believe there are a very few persons who dispute this fact. None of them is in any way a specialist in forestry. Our opponents claim that the forests do not conserve moisture, thereby regulating the stream flow, but that dryness is quite as much a characteristic of the forest as of the open plain; in other words, that conditions are the same, as far as moisture is concerned, whether there is standing a thick forest or whether the soil is directly exposed to the rain and to the sun. Every forester in the world stands on the other side; every scientist who is a specialist on forestry stands on the other side in support of the theory that forests do conserve moisture; that they do regulate stream flow, and that they do check freshets in the spring and droughts in the fall. But why is it necessary for us to consult scientists on a question like this? Sometimes when I see certain persons in the legislative branch of the national government, whom we have reason to suspect are carrying out private revenge, sectional hate or selfishness in the distribution of appropriations—when I see these men quoting specialists on other matters as authorities on forestry, I am reminded of the custom of the middle ages, which was, instead of going out and looking at something to find out what was the fact, to quote some musty tome written by a man who had never even himself seen the conditions on which he wrote. You remember Shakespeare's words which absolutely exemplify what I am contending. Here are the lines:

"Some say, that ever 'gainst that season comes
Wherein our Saviour's birth is celebrated
The bird of dawning singeth all night long:
And then they say no spirit dares stir abroad
The nights are wholesome; then no planets strike
No fairy takes, no witch hath power to charm
So hallow'd and so gracious is the time."

It seems too incredible that mankind, by constantly referring to venerable and mouldy treatises for five or six hundred years should have absolutely believed that all roosters did crow all night long on the night before Christmas, that Shakespeare should have embalmed the belief in exquisite verse, yet that nobody, not even Shakespeare, in all that time ever went out to the barnyard to see for themselves if the roosters for one night in the year really did become owls.

Now, it is not necessary for us to study any scientist's sayso about the forests as conservators of moisture, though every forest authority in the world is behind that basic fact. Every man and woman of us knows as a matter of personal experience that shade conserves moisture and sunlight dissipates it. The first thing that I was taught as an inspector of troops in locating a camp ground was that the one thing to be avoided in selecting a camp was the shade



SCOTCH PINES AT BRETTON WOODS
PLANTED BY THE BRETTON WOODS COMPANY



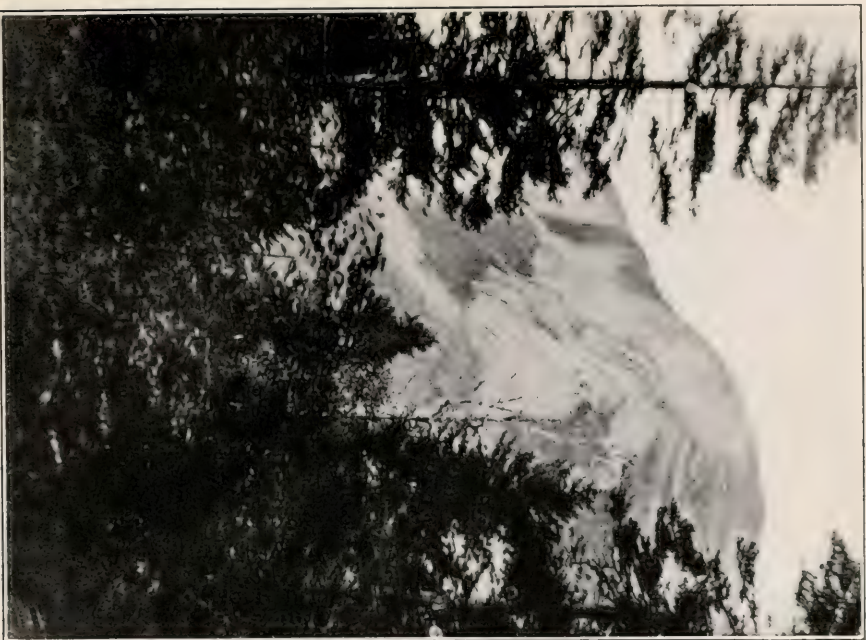
WHITE MOUNTAIN FORESTS

CLEAN CUTTING OF SPRUCE ON THE HIGH SLOPES.
YOUNG TREES ARE FELLED AND LEFT TO DECAY
IN ORDER TO GET OUT THE LARGE LOGS MORE
EASILY. FIRE FOLLOWS AND CONSUMES THE SOIL



WHITE MOUNTAIN FORESTS

MIXED PINE AND HARDWOOD
IN WATERVILLE, NEW HAMPSHIRE



THE TOP OF MT. OSCAR, ONCE CARRYING
A COMMERCIAL FOREST, HAS BEEN
MADE FOREVER BARREN BY FIRE FROM
THE LUMBER SLASH



WHITE MOUNTAIN FORESTS

WHERE FIRE AND EROSION HAVE
DONE THEIR FATAL WORK



CLEAR CUTTING ON THE UPPER SLOPE
OF MOUNT BOND

WHITE MOUNTAIN FOREST

of trees. For a camp to be sanitary, an open field, with dry sandy soil is to be preferred. You will find that any experienced soldier in selecting camp sites will take an open field, if possible, with sandy soil. Why? Because there are no trees there to conserve the moisture and create, therefore, possible rheumatism and fever for men who have to sleep on the bare ground.

Go and look in the forest yourself; you do not have to consult a book or a scientist to learn that brake and ferns and the moss and the lichens that must have moisture do not grow like corn and potatoes in the open fields. You have to go into the woods to find those particular forms of vegetation which must have moisture to preserve their very existence. Do you plant lilies of the valley in the blazing sunlight or poppies in deep shade? Does any laundry dry the weekly wash under trees? Will moisture evaporate, as our enemies claim, as swiftly in the shade as in the sunlight? Every flapping clothes line in the United States demonstrates the contrary. It seems ridiculous that any American, least of all a responsible American legislator, should for personal purposes solemnly try to deny not merely a scientific fact but the common law of nature.

The former President of the United States presented in a message to Congress pictures of hills in eastern China, where after the forests had been cut down, not merely did a steady supply of water fail, but the freshets occasioned by torrential rains washed away the soil itself, and with the disappearance of the soil regions, once the home of a densely packed population, are now not merely barren of vegetation, but barren of the population that they can no longer support.

You heard the state forester of New Hampshire promise us yesterday that he would show you photographs of some New Hampshire hills where the lack of a forest reservation has permitted the same kind of destructive cutting as in Spain, in China, in Italy, in northern Africa. By these photographs you will see that there is nothing left but bare, stony, gravelly hillsides that never can be reclaimed, because the soil itself is gone. To the figment of the theorist's imagination that forests do not control stream flow, we oppose a photographic fact.

Water is a beneficent servant to man if properly controlled, but if unrestrained by the forests on the hillsides it is more destructive than fire. A prairie fire will at least leave the soil behind, but the water rushing down a steep slope carries with it the very soil itself, leaving only the bed rock, which never can be reclaimed.

Another problem solved by the existence of forests along the banks of rivers, and especially about their headwaters, is the question of drainage. The great rivers, and notably the two rivers most affected by the White Mountain forests—the Merrimac and the Connecticut, and to a certain extent, the Saco, act not merely as sources of water power and water supply, but also as a great central drain through which the sewage of all the valley is carried out to the sea. In these later years we have seen low water in these rivers, notably in the fall, leaving exposed on the banks the disease germs which dried and blown about, are scattered as dust, menacing the entire district. Let not coming generations say of this one: "You were the ones who are responsible for planting disease for your children and your children's children. By destroying your forests you have robbed your children not only of their timber, not only of their water supply and water power, not only of the soil of the mountain sides and thus of the sturdy sons of the mountains, but by contaminating the river banks you have left us a legacy of disease and contaminated the very air we breathe."

I have been rather surprised at the opposition to forestry measures that has come from one member from the delegation from Kansas. If there is any state in the Union that has been planting trees and found the necessity of planting trees, it has been Kansas, and for another benefit which comes from the existence of forests, which I have not yet mentioned, but a very real one—the checking of the violence of storms, the tempering of climatic conditions, the protection of the home from the invasion of the tempest.

They have cyclone cellars in Kansas. They do not need them in Maine.

There is scarcely an existing object in civilization more beneficent than the tree, and, as I shall try to show you a little later, we recognize that feature in some of our little daily superstitions, even today. The countries where tree culture has been abandoned, and where the forests have been destroyed, once populous, now represent absolute wastes. Dr. Eliot delivered a most interesting address at Boston two or three nights ago, when he and Mr. Roosevelt vied in the earnestness with which they supported our cause. Dr. Eliot called attention to what he had seen with his own eyes in northern Africa and in Sicily and in Italy. In northern Africa, once as you remember, thickly populated and the home of strong nations, even before the days of Greece and of Rome, nations the very memory of which has almost disappeared, he saw a bridge spanning a gap between two hills which was some fifty feet above a dry mass of gravel. It seemed to him extraordinary that the bridge should be perched so high up in the air, especially when the place it spanned was absolutely dry and a mere mass of gravel and small boulders. His guide informed him that in the rainy season that bridge was constantly washed away by the torrents that tore down the mountains. Yet it was fifty feet above what was absolutely dry bed for the greater part of the year. The district was deserted, scarcely a person to be seen in a whole day's march, only some wandering robber Arab, through a district which was once the granary of the world. Why? They had cut the trees from the mountain sides; they had stripped the mountain tops; and with the destruction of the forests came the destruction of the soil itself, until barrenness existed where fertility had once sat crowned as queen. Water present or absent differentiates civilization from the desert.

In Mesopotamia there were no forests along the plain. There were forests at the head of the rivers and for the plain irrigation. This great fertile district supported the great cities of the past, Nineveh and Babylon, nations in the days of early civilization. What are they today without water? Bare, sun-dried plains, over which a few musty brick heaps are scattered to show where once were not merely cities but mighty nations that dominated the world.

Go further into Asia! Go into that region which was the very cradle of the human race, so thickly populated that the people were absolutely pushed out of it because there was not room for them. First came the great waves of the Greeks and the Latins; then came the wave of the Celts, who followed them; the Gauls, who have left their names in districts in Asia Minor, in what is now Austria, and finally where France now stands today. After the Celts came the Tentons, then the Slavs, then the Magyars, the Huns of Attila, and finally the Tartars and the Turks, all pushed out, not from the fact that the ground was not fertile, but because there were so many people there that it was impossible for them to find room.

What is that district today? The trees have all been cut down from the slopes of the mountains—not swiftly, as we are doing it here in the United States, but gradually. With the disappearance of the trees has come the disappearance of the soil; and with the disappearance of the soil the disappearance of the people; because, when the soil is gone, the people cannot remain. The very district of the world in which the human race was cradled

is today a barren wilderness, without a tree, without a farm, tenanted by a few roving Tartars and Turkomans, living largely by robbery, driving their sheep about to snatch a scattered meal on such weeds of the desert as can find some little sustenance in the crevices between the rocks. That is the condition of the cradle of the human race today. Let it not become the condition of the United States of America, where by the destruction of the trees, then the destruction of the soils, these mountain farms which have produced the finest, strongest citizens among us are deprived of their people as well as of their soil on which they live.

We have, it is needless for me to say, one hundred and ninety-two millions of acres in national forests of the United States. Except Florida, all the states now possessing these forests, supported by taxes taken from all the people of the country, are in the favored western states. The whole Atlantic slope, every state of the old thirteen, is taxed every year to pay its proportion for the support of these national forest reserves. The nation pays four million dollars a year in round numbers for the maintenance of these existing national forest reserves.

We only ask for justice. We are glad and happy, we of the east, to pay for California's national forests, for those in Colorado and Montana and Oregon and Washington, and all the rest; we are glad to pay our part of the four million dollars which the national government pays for the maintenance of those western national reserves. More than that, my own state does not need, and cannot use, one dollar for purposes of irrigation. We are glad and happy not only to assist in maintaining the national policy of irrigation in other parts of the United States where irrigation is needed, but the Commonwealth of Massachusetts, without one square inch of soil where she needs any national help for irrigation, sends delegates to the National Irrigation Congress to support the needs of Colorado and of California and of the great states in the west where dry alkali plains are by irrigation to be converted into fields of verdure that blossom like the rose. We ask, in common justice, that if the Rocky Mountain plateau and the Pacific slope receive from the national government four million dollars a year for the maintenance of forest reserves, that the east in turn should be given at least as much out of the national revenue for the acquisition of national forests. If it is right and just to tax the east for national forest reserves in the west, it is right and just to tax the west for forest reserves in the east.

The statement is made, and it is of course true, that the existing forest reserves, though supported by the national government, were not actually bought as forest reserves by the national government, but constructed out of the national domain. Well, how did we get the national domain? Did the state of Colorado participate in the Louisiana Purchase? Did Oregon buy the Gadsden Purchase, or pay the bills of the Mexican war? Did any of those states which were created out of the national domain pay for the land which they now occupy as states and for the land reserved for forests? Who paid for the Florida Purchase? The states now without national forests. Who paid for the Louisiana Purchase? The states now without national forests. Who paid for the Gadsden Purchase? The states now without national forests. Who paid the bill of the Mexican war? The states now without national forests. Why are Oregon and Washington in the United States at all? Because a Yankee ship captain sailing forth from Scituate where his ship was builded, the good ship Columbia, rounded Cape Horn, first carried the American flag around the world, sailed up that western coast, fortunately landed there a year ahead of Vancouver, the English adventurer, and buried in the soil of what is now Oregon and Washington tokens and medals from the old Commonwealth

of Massachusetts. By right of his prior discovery, Oregon and Washington are under the Stars and Stripes and not the Union Jack. The Columbia River was named not from "Columbia the gem of the ocean," nor for Christopher Columbus, but for that New England ship, the ship Columbia. As the capes at her mouth were named "Cape Hancock" and "Cape Adams," as the very Indians in calling every white man "Boston man," testify who it was that made Oregon and Washington, not Canadian, but American. We ask of the new states of the west and of the northwest common justice for the older states, south and north, that have made not only the existing national forests but the very existence of these newer states themselves a splendid factor in the common history of our common country.

We had a splendid result of our work last year in the passage of the Weeks bill. Too much cannot be said in praise of the tact, the persistence, the courage and ability of Congressman Weeks in putting through this measure. You know, also, that it is to come up on the 15th day of February in the Senate, the House bill having been substituted for the Senate bill. All we need to get this legislation is to get one vote on that day. As usual, our enemies, from motives which I will not discuss, are making their real attack in the old, familiar way, not upon the merits of the measure, but by indirection. They have amendments which they will offer, pretending that they mean to increase the benefit. Do not be deceived! Every amendment offered to that bill as it stands is really a move for delay, the intention being to prevent an immediate vote on the bill, and to throw the bill back to a committee of conference between the houses. With only two weeks between the vote on the 15th of February and the dissolution of Congress, it would thus be easy to kill the bill, quietly to stifle it in committee, as you have seen it stifled again and again before by certain influences and interests in the United States that thrive not by sunshine or publicity in their methods.

So, the work of this association, the practical work of this minute and from this minute to the very day, and every hour of every day until that vote is taken, is to see that no amendment of any kind is made to that bill; that when that vote comes on the 15th of February our bill is passed absolutely unaltered and unamended; that every amendment is voted down and the bill passed. Then for the first time we may see the east and south treated with the same generosity with which the nation has treated the west; then shall we see the first strong step for the preservation of the timber, of the climate, of the water supply, of the water power, of the soil, and with the preservation of the soil, the preservation of the people, through the whole Appalachian slope, from the Canada line to the Gulf of Mexico.

If the preservation of the trees were justifiable on no other ground, surely it would be well to conserve the forests as places of refuge, where the jangling nerves of our feverish American life could be soothed and smoothed and brought again into subjection, where excitement could be charmed away by the green shade and the shadows and the restfulness that Mother Nature spreads around beneath the sheltering forest's shade.

American life is hot and hectic, and needs at times to flee the crowded market place and the shrieking streets, where modern life incessantly assaults the nerves of hearing and sight. Surely we need to seek asylum where we may in quietness and in great silences feel the influence of things that are not material, the things that appeal to our better natures and restore to our lives that calmness of spirit on which, not on hysteria, the greatness of a people is builded.

Not without reason is respect for trees almost the oldest instinct that is in us. Our daily life, even now, is punctured by a constant reminder of the



SOUTHERN APPALACHIAN FORESTS

PERENNIAL SPRING ON SLOPE OF MOUNT MITCHELL.
THESE FOUNTAINS OF HEALTH AND WEALTH AND
BEAUTY DISAPPEAR WITH THE FORESTS



SOUTHERN APPALACHIAN FORESTS

FALLS ON THE UPPER CATAWBA RIVER,
IN THE GREAT SMOKY MOUNTAINS,
NORTH CAROLINA

old gods of the trees. You think that is too strong a statement? How many times have you tapped wood yourself, as a matter of superstition, of appealing to the gods to avert some threatening evil? This is the last instinct that remains to us of that primitive religion, the worship of trees, as gods, by the recognition of the beneficent influence which the trees exert on human life, which even the savages of prehistoric days, in their crude way, did understand, magnifying a natural necessity into the existence of a tutelary divinity.

You remember the traces, the familiar ones, of that old worship. Go to Vienna. On the Graben, the fashionable shopping district of Vienna, you will see there in the corner of the street, the Stock im Eisen, where every journeyman workman, before starting on his journey in which he was to practice his trade throughout Europe, before settling down as a master mechanic in his own shop, where every journeyman artisan, when starting on his travels went to this old tree stump and drove in a nail for luck in the last remaining stump of the ancient sacred grove, the Wienerwald.

Do you remember that when Charlemagne overwhelmed the Saxons he found them impossible to conquer until he had come to their sacred grove and cut down their Irminsul, as it is called in the French chronicles, Herman's Säule, the pillar of Herman, the Teutonic hero, better known in the Latin chronicles as Arminius. The tree was worshipped before Arminius won his victory. It was the last relic of a sacred grove, where the worship of trees had at one time been the overwhelming, universal worship of the entire people.

We know very little about the Druids, that strange race of priests, who dominated France and England, but we do know that the worship of the oak tree and the use of the mistletoe were known far before the dawn of history. I do not know whether the special use we now make of the mistletoe was permitted in the special rights of the tree worshippers, but certainly it was a very charming custom if it was. Last of all, in our daily life, what is the Christmas tree? Why do we have a tree at Christmas? Why, you know that this Christian festival was built upon the ruins of Pagan rites, which in one form or another, took place in almost every country of Europe at the winter solstice, at the turning of the sun in December. The sacred tree was, before the coming of Christianity, a feature in most of those ceremonies. The Christmas tree of Germany is a relic of older tree worship copied in the Teutonic religion of Odin and Thor and Valhalla. The German Christmas tree is the survival of the great tree Ygdrasil which, according to the Scandinavians and Teutonic myths, supported the entire earth.

Of all natural products of the earth the trees perform for humanity the greatest and most varied service. Respect for trees is as naturally supported by sentiment as by common sense. Mankind began, as it hopes to end, in Paradise. What is Paradise? The Greeks and the Hebrews borrowed the word from the Arabs. Paradise, or *Paradisos*, means nothing but a park, a place of shrubs and flowers and trees, where the springs rise and the brooks flow and the birds sing out their messages of beauty and of peace. To the mind of the Arab on his parched sands, the most beautiful thing in the world was the oasis where the trees grew and the water sprang, life-giving, from the ground. Our birthplace and our Heaven, in name at least, are one. Not without reason did the poet sing of them: "The groves were God's first temples."

SHALL STATES REGULATE THE MANAGEMENT OF PRIVATE FORESTS?

BY HERMAN H. CHAPMAN

ASSISTANT PROFESSOR OF FORESTRY, YALE FOREST SCHOOL.

WITH the rising tide of popular interest in forestry has come a strong demand for the regulation of private forests by state governments. In more than one state laws have been proposed aiming at the control or limitation of timber cutting by land owners, by obliging them to leave a certain portion of the timber standing, but so far, no state has actually passed any such legislation. The utmost accomplished has been to compel owners to reduce the fire risk resulting from lumbering, by making proper disposition of the tops and brush.

Has the state a right to prescribe conditions affecting the handling of private property, if such action tends to diminish the profits and increase the expenses of the owners? It has this right, provided it can be shown that such regulation is necessary to prevent definite damage to the property and welfare of others. But this damage must be of a character and severity that justifies the state in taking such action. This principle underlies all forms of state regulation, as factory laws, prevention of stream pollution, or any law, the effect of which is to force private owners to do things at their own expense, in order that the public welfare may be better safeguarded, and to do them without compensation from the state.

Although no laws have been passed regulating cutting of timber, it is well known that the supreme court of Maine, in March, 1908, rendered, at the request of the Maine legislature, an advisory opinion upon the constitutionality of laws designed to "restrict the cutting or destruction of small trees growing on wild or uncultivated lands, by the owner thereof, without compensation therefor, to such owner." The court upheld the constitutionality of such proposed legislation on the general grounds that "the legislature has full power to make and establish all reasonable laws and regulations for the defense and benefit of the people of the state, not repugnant to the constitution of the state or the United States, * * * and however inconvenienced, restricted or even damaged particular persons and corporations may be, such general laws and regulations are held to be valid unless there can be pointed out such provision in the constitution of the state or of the United States, which clearly prohibits them." The constitutional provision most apt to be cited as a barrier to such legislation is: "Private property shall not be taken for public uses without just compensation." The Maine supreme court's opinion covering this point was: "We do not think that the proposed legislation would operate to 'take' private property within the meaning of the constitution. While it might restrict the owner of wild lands in his use of them, might delay his taking some of the product, might delay his anticipated profits, and might even thereby cause him some loss of profit, it would nevertheless leave him in his lands, their product and increase untouched and without diminution of title, estate, or quantity. He would still have a large measure of control and large

opportunity to realize values. He might suffer delay but not deprivation. While the use might be restricted, it would not be appropriated or 'taken.'"

The Maine legislature has never taken advantage of this opinion of the court to pass any laws regulating timber cutting in that state.

It thus appears probable that the regulation of private forests is constitutional, if justified on the grounds of public necessity. In what does this necessity consist? There are three ways in which forests affect the public welfare. They are used as public parks and health resorts; they influence indirectly the run off of water and soil erosion; and they furnish wood products.

It will be generally conceded that the state should not require private owners to refrain from cutting, merely to preserve the aesthetic features of the forest. Where parks are desired by the public they must be bought outright. The state must own the property. The public rights can then be preserved. Parks usually mean prohibition of cutting. This is not forestry, though often urged under the guise of forestry. Neither is it conservation, but waste, pure and simple. Yet, if the public want the forest solely for its park features and are willing to see it rot rather than use it, there is no constitutional objection provided the property is purchased of the owners.

To deprive an owner of all use and profit is, of course, unconstitutional and requires compensation by purchase.

Can the state force an owner to modify his cutting for the purpose of continuing the productiveness of the forest, for the sole purpose of furnishing the public with wood products?

Theoretically this might be done if it could be shown that wood was indispensable to the public welfare, that it could not be obtained elsewhere, nor satisfactory substitutes found, that the amount of land available for wood production was limited, and that the state itself could not assume the burden of purchasing and managing such lands for wood production. In this connection the supreme court of Maine said: "The amount of land being incapable of increase, if the owners of large tracts can waste them at will without state restriction, the state and its people may be helplessly impoverished, and one great purpose of government defeated." But while possible, the constitutional grounds upon which such legislation rests are rather shaky, and depend not only on demonstration of the need of such measures, but also upon the cost to the owner.

Timber is a crop, but one which requires from forty to one hundred years to grow. Let us compare it with agricultural crops. It is a matter of vital interest to the public that all agricultural soils be brought under cultivation, and that the methods of crop rotation and diversified farming best calculated to maintain the productiveness of the soil and the largest yields be generally adopted. If it has been clearly demonstrated that fertilizer is necessary, a law might be passed requiring the use annually of a certain quantity per acre of commercial fertilizer or its equivalent in barnyard manure for every acre of tillable land. The proper rotation of crops, grain, hay and pasture, might be worked out for certain districts and incorporated into a law whose purpose would be to force improvident or ignorant farmers to do better farming, on account of the importance to the community of preserving the fertility of the soil and producing the maximum yields. Has such legislation ever been passed? And would any legislature of farmers find great difficulty in pointing out a few fairly plausible reasons why it should not pass? From the standpoint of the producer, he alone should be the judge as to methods, since he must bear the financial risk of the undertaking. And the farmer knows well enough that no law could be passed regulating his methods, since these must be determined according to local conditions in

every case. Fortunately, the interests of the individual and the community roughly coincide in the case of agriculture, and, since sound methods pay best in the long run, they will be adopted sooner or later. The public interests in progressive farming are not cared for by laws regulating the operations of the farmer, but by laws for the support of experiment stations, and providing methods for the dissemination of progressive ideas, and the education of farmers' sons in modern farming methods.

Financially, the owner of timber land is in the same position as the farmer. Timber may be necessary to the public, almost as necessary as food crops, but the grower of timber crops must make it pay. The public has no more right to demand that land owners raise timber crops if they cannot do so without losing money than it would have to insist upon farmers or manufacturers conducting their business in the face of certain financial loss or ruin. In the case of the timber land owner, risks of an especially pronounced nature must be incurred if he is to cut a second crop of timber from his lands. All his expenses are practically sunk in his young timber, and can not be realized on until it is big enough to cut. This period even for rapidly growing species is seldom less than forty years. To cut sooner would sacrifice a certain large value for a very small immediate value. Since not only is the investment sunk but the use of the money is lost for the period, there being no income, the expense increases at compound interest for the entire period and would equal the accumulation of a similar sum deposited in a savings bank and not touched for an equal period of years.

An owner cannot practice forestry without incurring expense, and this comes principally at the start. It costs something to leave timber standing when logging a tract, since not only is the timber not realized on, but the logging operation costs nearly as much without as with the timber not taken. It costs something to burn brush, lop tops, build fire lines and protect the property from fire. Taxes will have to be paid for forty years on the property, on a valuation and rate largely determined by local officials who are apt to discriminate against non-resident timber land owners, and these taxes will accumulate at compound interest against the investment, until the timber is big enough to cut. The property produces no revenue from which to pay them until the timber can be sold. During this period there is a constant risk of fire, which in some districts amounts to a certainty that young timber will be destroyed. Old timber with its thick bark may escape damage and if killed can be cut and used, but the young stands are worth nothing now and are easily ruined even by light fires.

Under these conditions would it be constitutional to require land owners to grow timber for the benefit of the public and assume all the risks? It is clear that the growing of timber crops by private persons may be encouraged but not forced by law, for it would be doubtful if the state could guarantee freedom from financial ruin which is a prerequisite to such a requirement. The duty of the state is to strengthen her system of fire protection so as to reduce the now almost prohibitive risk to a reasonable one, and to reform her tax laws so that the forest crop is taxed, if at all, only when it is harvested, and not every year during its growth. Progressive states are already accomplishing great things in the improvement of fire protection, but so far no state has given the land owner any encouragement whatever on the subject of taxation, and the present system if accompanied by increase in valuation of timber lands, which seems probable, might absolutely prevent private citizens from growing timber profitably. In addition to these beneficial measures, states can and do, through the office of state forester, and the establishment of demonstration forests and in other ways, encourage and educate the individual to grow timber. Can they force him to do it?

The third way in which forests affect the public is through their indirect influence on rainfall and on the behavior of water.

Where the influence of forests and forest removal can be directly traced and affects in an appreciable manner agricultural and commercial interests, we have sound constitutional grounds for interference with private actions even to the detriment of the individual, such as are not furnished by the public interest in parks or in timber production.

These indirect influences of forests are their effect on rainfall and climate, and their effect on the flow of water, soil erosion, streams, navigation and water powers.

It has been repeatedly denied by many scientists and meteorologists that forests increase the total rainfall in a region or modify the general climate. The forest cover is not without its effect on temperature, evaporation, and soil moisture, but these effects are felt only within the forest or in the immediate vicinity. Such effects may be typified by wind breaks. The influence of a wind break may be beneficial to a distance of ten times the height of the trees, and it is possible to grow better crops in its protection than without it. But the state would not be justified in denying the owner of a woodlot the right to cut his timber on the grounds that his neighbor would be injured by losing the benefit of the wind protection which the grove previously afforded. In the absence of scientific proof of the general beneficial effect of forests on climate and rainfall, since extended research indicates that these influences are not exerted except for infinitesimal distances beyond the forests, the state must seek other grounds for regulating the affairs of the owner of timber lands. But in case this influence is considered a sufficient justification for state interference, it is the woodlot owner to whom regulation should be applied, for it is on the borders of groves and woodlots that these influences are important.

There remains one strong argument in favor of state regulation. Whatever may be said to dispute the influence of forests on rainfall, their effect on the flow of streams and on soil erosion has been completely established. Within the forest the presence of a vegetative cover, no matter how slight, tends to catch and delay the flow of rain water, and to increase the porosity and absorptive power of the soil, besides preventing more or less completely the carrying away by erosion of the soil into the streams. Any vegetation cover does this in part, but the forest does it most effectively. The direct effect is a lengthening of the period of flood in the spring or at times of heavy rains, and a great lessening of its severity. The low water stage is aided by the flow of springs, which usually dry up when forest cover is removed or destroyed. The water which reaches the streams is usually free from sediment, and the process of silting up of streams is prevented. These facts are well known and their importance to navigation and manufacturing and to agriculture along such streams is evident. Unlike the influence on climate, the effects are caused by the influence of larger forest areas often far removed from the ultimate interests affected. The possibility of state regulation to prevent the evils resulting from denudation of such areas is worthy of serious consideration.

Here as elsewhere there must be established a definite connection between cause and effect. It must be shown that the forests designated do have an influence which justifies the interference of the state to prevent their destruction. On lands which are fairly level the influence of the forest in checking the flow of water and preventing soil erosion is very small. At the same time agriculture becomes possible and cultivation often increases the storage capacity of the soil for moisture to a point equal to or exceeding the capacity of the soil if forested. With increasing slope, cultivation becomes difficult

or impossible, danger of erosion increases rapidly and the forest becomes indispensable to soil protection and water control. Because of this, the indirect influences of forests are of economic importance chiefly in mountainous regions, but in such regions they are paramount. In level districts it is quite possible to control the flow of streams far more successfully by large storage reservoirs and dams than by forest cover, and such a system is at present in force in Minnesota on the headwaters of the Mississippi.

The national government has never attempted to regulate private forestry since the citizens of a state are subject in such matters to state jurisdiction. To a state that is determined to legislate on this subject, certain lines of action are open.

The first step is to classify lands. Whatever may be the basis decided on as giving constitutional justification for regulation, this basis must apply to specific classes of land and the distinction must be such that no injustice is done the owner. The broadest and most necessary distinction is between agricultural and forest lands. Any law which forbids the clearing of timber from land agricultural in character would be against the best interests of the state. An owner cannot be forced to retain his timber land as such if it would be possible to use it for a more productive purpose. Consequently, no law can ever be passed which will successfully regulate the cutting of forests on land that could be used for agriculture. And any law designed to apply only to non-agricultural land must carry with it some provision for the determination of the character of the land, before the land can be successfully brought under the operation of such a law. Rough approximations might be used, such as the inclusion of all lands above a certain height or contour, in mountain districts, or lands exceeding, say ten per cent of slope. But the legal right to enforce regulation of cutting will usually be contestable until each tract of land is examined by legal authority and definitely classified as coming within the operation of the law. To pass a law requiring some general limitation on the removal of timber, such as a diameter limit, without providing at the same time for the classification and listing of the lands affected would be useless and the law a dead letter.

Since the justification for regulation lies in the evils resulting from forest destruction, the object sought by such legislation should be to insure the perpetuation of the forest, without confiscation or unnecessary interruption of the legitimate profits of the owners. If this is impossible, the state may have recourse to condemnation or purchase of such lands, whereby the owner is compensated, and the state can then carry out any policy unhindered. But, granting that the state has no right to insist that the owner abstain from cutting his mature timber, unless it purchase his property, the object of the state must evidently be to secure protection of the immature timber and provision for reproduction of stands. Right here is where the chief danger of popular legislation on this subject arises. The temptation to enforce a principle by means of a specific method is strong and often regarded as necessary. Small trees are usually young trees; a diameter limit would prevent the cutting of small trees and would therefore preserve the young trees. Thus the forest would be preserved. This quack remedy, for it is nothing else, is comparable to the suggested legislation prescribing the amount of fertilizer to be annually applied to agricultural lands, or the rotation of crops to be followed. It might work on some kinds of forests or parts of a forest. Elsewhere it might amount to confiscation, or prevent the very object it was intended to secure. Even in spruce forests which happen to be of a character which would permit of such an operation in some places without serious consequences, a general application of a definite diameter limit would not be possible. In all forests of pure spruce the species is subject to windfall. The

trees left standing, especially if isolated, usually blow down. On high slopes spruce never or seldom attains large diameters, and could never be cut at all under such a law, which would therefore be confiscation. In forests of mixed spruce and balsam or spruce and hard woods, the spruce can be favored only by allowing the cutting of these other species to a smaller diameter limit.

In forests composed of the valuable species of pines, the stands make their best growth when the whole stand is composed of trees of the same age. Such stands should be either cut clear and planted, or selected trees marked and left to produce seed. A law of growth common to all trees is that the poorest individuals in a stand grow the slowest. A diameter limit law in such stands where all trees are the same age would result in leaving all the stunted, diseased and suppressed trees standing—just the trees that should be removed.

Wherever it is possible to grow forests under good management near markets, it is **necessary to thin out the stands** from one to three times before the mature trees are finally cut. In these thinnings it is not the large but the small and suppressed trees that are removed, to the great benefit of the remaining stand. A diameter limit law would make such thinnings illegal. Such illustrations will suffice to point out the absurdity of endeavoring to prescribe uniform technical methods by legislation, in the case of either farms or forests.

But if the principle of forest regulation is sound, the desired results can still be attained. The aim in view is, that the forest must be perpetuated or renewed and not destroyed beyond hope of renewal.

In the case of the national forests, the federal law specifies the objects to be attained in setting aside the forest areas belonging to the government, and gives the secretary of agriculture power to make and enforce all necessary regulations covering the technical methods involved.

A state which has adopted a rational basis of land classification and has constitutional grounds for insisting on interference with private owners, evidently must pursue a similar policy. The state forester if his office is removed from political influence and if he is a technically trained man, is the proper person to administer such a law. If a state has no such official the first move must be to secure one. Power must be given him to make regulations which will attain the desired results or to prescribe the methods to be followed as a result of inspection on the grounds and with full knowledge of local conditions. It is undoubtedly true that the enforcement of such regulation by a state service would require a considerable extension of such service and the employment of sufficient assistance to insure the observance of the law. But to try and avoid this expense by specifying technical details in a law and then trusting to luck for their enforcement is not only inadequate but insincere. No law was ever enforced without a definite provision for its enforcement, and this is especially applicable to a law which would attempt to make private owners do something it was not to their financial interest to do. Furthermore, the failure to rigidly enforce such a law would result in placing the additional expense on those who obeyed the law and giving a financial advantage to those who avoided or refused compliance, thus putting a premium on dishonesty. Proper inspection therefore is as vital as elasticity in application to local conditions, for the success of a law of this kind.

While laws regulating cutting have not so far been adopted, several attempts have been made to regulate private owners in regard to the disposal of slash and the use of fire. It is not so necessary in this case that the lands be classified, but a law may apply to all lands. In New York state, a law has been in force two years which requires lumbermen to lop the branches off the tops left from logging, so that they lie flat on the ground. In operation

this law is confined to the counties included in the forest preserve which takes in most, but not all, of the spruce region of the state. This law has been complied with for the reason that within this area the state had established a complete system of state rangers employed on a salary for constant duty who, besides patrolling to prevent fires, are required to enforce this law. Even then, there was considerable difference of method between different rangers, as to the size of branches to be cut off and thoroughness of lopping required, and whenever possible, operators neglected to comply until threatened with prosecution or did the work as cheaply and ineffectively as the inspection would permit.

The state of Minnesota recently required lumbermen to burn the slash after logging at times when there was no danger of the fire spreading and doing damage. This law applied over an area of 3,000,000 or more acres and to enforce it the state had practically no organized force. The fire law authorizes the employment of state rangers but these are taken on during the fire season, when the brush cannot be burned. The brush burning law consequently has not been enforced, and very little more brush has been burned than would have been without it, while in one or two cases fires were started by burning it at improper times. The principle of both these laws is to require that something be done which costs money, in order to improve the conditions for forest growth and reproduction by diminishing the fire risk. With all such laws, complete state inspection is the only road to success.

It has been found possible, however, in several states to enforce restrictions in the use of fire by a system of fire wardens more local in character. Laws which require permits for burning brush in a dry time on or near forest lands, simply regulate the manner of performance of acts which the owner intended to do anyway and cost him very little more, except some extra trouble. Such laws are not so difficult to enforce.

The main trouble with efforts to force private owners to practice forestry against their will is that the public is in reality attempting to get something for nothing. The expense and risk are not borne by the people for whose benefit the regulation is demanded. It is a natural development of popular interest in forestry that efforts of this kind should be made in order to put a summary end to forest denudation and accomplish at one stroke without expense, the work of years of patient effort and organization. But such short cuts usually fail. In the early history of European forestry many such measures were attempted. Yet in an environment much better suited to arbitrary enforcement of such laws, such states as Prussia long ago came to the conclusion that the regulation of private forests except where their effect on streams and soil erosion was clearly proved, was attended with such difficulties as made it inadvisable to attempt it.

To sum up: What should states do? The importance of forestry is not diminished by the difficulties in the way of regulation of private forests. First, encourage private forestry and make it financially profitable. Do this by extending the facilities for popular information on forestry subjects, by establishing demonstration forests, and especially by improving the system of fire protection, and reforming the laws on forest taxation. Second, inaugurate the policy of buying land most in need of a perpetual forest cover and managing such land by the state as an owner, with all the rights of an owner. Under such a policy Pennsylvania has bought over 900,000 acres since 1897. Third, enforce a reasonable degree of regulation on lands where the indirect influence of the forest on streams and erosion is clearly proven, but put the interpretation of such regulations in the hands of a qualified forester with sufficient assistance to insure its full enforcement.



SOUTHERN APPALACHIAN FORESTS

GORGE OF DOE RIVER, TENNESSEE, WHERE
THE AX AND FIRE HAVE BEEN FOLLOWED
BY DESTRUCTIVE FLOODS



DEBRIS FROM WRECK OF SAWMILL AND LOG BOOM ON
LINVILLE RIVER, BY FLOODS



SOUTHERN APPALACHIAN FORESTS

DESTRUCTIVE LANDSLIDE CHECKED
BY THE FOREST

CITY TREES AND THEIR RELATION TO FORESTRY

By J. J. LEVISON, M. F.

FORESTER FOR BROOKLYN AND QUEENS PARK DEPARTMENT AND FOR THE AMERICAN ASSOCIATION FOR THE PLANTING AND PRESERVATION OF CITY TREES.

(This address was delivered before the American Forestry Association, January 12, 1911.)

THE solution of every great public question depends ultimately upon the majority of the people interested, and if forest legislation is to be effected at all, then the interest of all citizens must be enlisted. Of the ninety-one million inhabitants of the United States, thirty-five million or 38 per cent are living in cities of 8,000 or over. Whereas in 1900 there were only 546 such cities, there are this year 726 of them, showing a gain of 180 cities in the last decade. The increase in the population of these cities amounted to nearly ten million against a six million increase in rural population. All this shows a striking tendency towards urban life and so if forestry is to obtain its support from the people, the people of our cities must also be reached and reached in cities, where they are. This is city forestry.

That, however, is not the way our foresters and friends of forestry generally regard the city tree problem. In their enthusiasm to serve the nation, they have in some respects overlooked the citizen. By all means conserve your forests, conserve your mineral and coal lands, but do not exclude the conservation of human qualities—the strength and character of the nation—and there is no better medium of conserving those qualities than the medium of trees around the homes of our citizens. I need not dilate at a meeting like this upon the well known advantages of trees in a city. I need only point to this, our capital city, of which every American is proud, and ask if it is not its beautiful trees as much as its architectural beauty that you admire. The wonderful progress of forestry in the last few years has fostered a strong interest in city trees and now the two are intensely influencing each other. For, as a matter of fact, when you analyze the situation carefully, you will see that the average citizen must acquire his first lesson in forest preservation from his own tree in which he is naturally most interested. His own tree has a definite meaning to him while the forest problem of the nation is only an abstract idea with which he is not familiar and for which he cannot have true sympathy. His own tree to him means better air, increased property value, better sanitary conditions and more beautiful surroundings for himself and his children. His love for his own tree soon reaches out to the other trees of his neighborhood because he realizes that like his own interdependence with his fellow citizens, his tree is most valuable only as a part of the others in the vicinity; for if the others are diseased, his would not be safe, or if it stood alone, the surroundings would not be half as charming and the tree could not be cared for as cheaply or as efficiently as where all the trees of the community are cared for as a whole by some one person designated for that purpose. The cause of all the trees in the neighborhood now becomes a common cause, and with proper guidance that civic interest can be directed to the interests of the whole city or state and from that

to those problems which concern the welfare of the whole nation. Such citizens will then have an interest in trees which will be deep rooted and an understanding clear with experience. To them you can then easily present the problems that you are laboring for and be assured of their hearty support. I could cite hundreds of cases where in my relations with citizens on questions pertaining to their shade or ornamental trees, the interest aroused at the time, formed an entering wedge for broader considerations of more general tree problems. To minds so prepared, I could easily make the forest situation of the country intelligible and convert them to your way of thinking on forest policies. With a nation so trained in the love for trees, see what wonders you could accomplish! What can you do otherwise? My contention, therefore, is that the city tree is the natural stepping stone to the broader problem of national forest preservation and that much time is lost in trying to reach the latter without the former.

Trained foresters generally do not feel that way. They often consider the city tree problems too small to deserve their skilled attention. Well, that all rests with the forester himself. He can make it small or he can find a field even more varied and of as high a standard as the work of those connected with the national forests.

The ordinary problems of the city forester are planting, extermination of insects and disease and protecting the street trees from accidental or wilful injury, such as cutting down of trees by shopkeepers whose stores they may slightly screen; protecting the trees from injury by public service corporations and private promoters and guarding them against gnawing horses, house movers and street graders. There are different ways of doing even this work. There may be the old fashioned gardener's way or the way of the modern scientific forester. There are very few trained foresters in this country in charge of park and street trees and the old fashioned methods or rather no methods still prevail.

But there are bigger problems in city tree work worthy of the attention of our best trained foresters.

First, there is the city forest park idea—a chance to establish a model forest right in the city and to lay your principles of conservative forest management right at the threshold of every citizen. The parks of our cities have hitherto been looked upon in most instances as storehouses for elaborate buildings, ornamental cut stone and floral designs, so that today the common conception of a city park is the usual costly and ornamental park found in almost every city. The people do not think of the possibility of having bits of woodland or miniature forests in the city where they can find the peace and restfulness they are seeking. There are times when the formal and costly park is a necessity, but there are also vast opportunities for the city forest development. It is a new departure and let our trained foresters come in and show the people how attractive nature is in the simple charm of its woodlands and how comparatively little it costs to develop and maintain such bits of woodland. There are only a few forest parks in this country and while the cities are still young, it is possible for them to set aside small tracts of woodland in their suburbs at a small cost and within a few years they will find themselves the possessors of ground not only worth many times the original cost, but also of inestimable value to the health and development of the citizens.

The people of Brooklyn and Queens have set aside a tract of 536 acres of woodland in the heart of the city for a forest park and they are not a bit sorry for it now. There have as yet been no funds designated for the development of this tract, but we did succeed in establishing there a forest nursery of 80,000 seedling trees at a cost of one and one-half cents per tree including the

planting. This, too, is a novel feature in city tree work and offers unlimited opportunities to the city forester.

The beneficial effects of this nursery have already become evident. Citizens and school children come to study it and the people are beginning to realize that tree planting is not so expensive after all. Even where we have been obliged to buy larger trees for our park planting, we have this year purchased five hundred oaks and many other hardy trees two inches in diameter at two dollars each, instead of resorting to the usual method of buying larger trees at ten and twelve dollars each. The younger trees will take better to the soil, can be planted at a considerably smaller expense and in the end will catch up in growth with the larger specimens.

The city forester also has an important educational value to the community and can make his influence strongly felt. He can best reach the people on tree questions because he is constantly in touch with them in solving their local tree problems. He meets them in their homes, he lectures to them in the public schools and in their civic and social organizations, he writes for them in the local papers, magazines, school journals, museum bulletins, reports and pamphlets.

The city forester can bring the parks and boulevards in closer touch with the people. Through the medium of his parks and shaded avenue, he can stimulate a love for the beautiful which, though innate in most people, needs to be unearthed in the average city dweller. He can teach the people to know the common trees by labeling prominent specimens in the parks and along the boulevards. He can issue guides to the trees for those desirous of more detailed study; he can have exhibits showing the various phases of tree planting and care. In Brooklyn we have had four exhibits of this sort in the past year. He can form tree clubs among adults and among school children and designate to them definite problems in the planting and care of the trees in their locality. I have tried this in Brooklyn and in other cities and in two instances it has resulted in the formation of permanent local forestry organizations and in another in the establishment of a municipal tree bureau. The tree clubs among school children are of special significance because upon them will depend the future of our forests and the delightful memories of blissful days passed with beautiful trees in youth may seriously influence their later acts. The schools themselves are much in need of trees around them and the children can be made to plant them. To show you this need, let me cite the conditions in Brooklyn where out of the 166 public school, 96 or 58 per cent have no trees at all, 60 or 36 per cent have a few trees, and only 10 or 6 per cent are completely surrounded by trees. In other cities, the conditions are not much better. Why spend millions of dollars on architectural embellishments and nothing on trees? The opportunities for effective work in city forestry are thus numerous and varied, but how are they met by those at present in charge of the field?

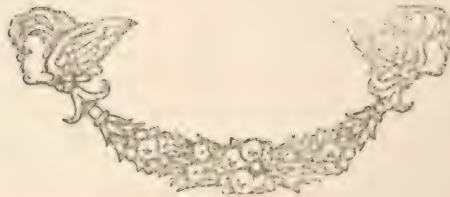
In Brooklyn and Queens, one will find the most extensive range in the country for city tree work—54 parks, 160,000 trees on the streets and boulevards, the most varied conditions—good and bad, and considerable opportunity for improvement and educational work. As I have the honor to represent these two boroughs, I can say that we are very active on just such lines as I have described. There are several other cities and towns giving special attention to their trees and doing good work.

But the majority of our towns and cities are not yet awake to their tree problems. It is quite true that their civic pride has been aroused in many instances to definite action, but their leaders have selected other banners of reform and overlooked the trees. This is not because their trees do not need attention. The trees of almost every city in the country are suffering from

neglect. As you know trees are too tolerant of abuse to go all at once, but their decay and ruin are matters of certain progress if once neglected. When the ill effects become evident the people blame the caterpillars or the fungi. But the truth is that the caterpillars are only one factor in the problem and the civic uplifters who ought to know better are the other factor. Here then is a field for champions in the cause of tree preservation. It is pioneer work and the cause needs good men. Let the trained foresters enter the work and with your aid our cities will become aware with trees and the minds of the citizens alive with interest and sympathy for the forest problems of our country.

Now, the American Forestry Association can be greatly instrumental in accomplishing this end. I would suggest that the American Forestry Association adopt measures for taking an active interest in city tree work. It might establish a city tree department co-operating with the American Association for the Planting and Preservation of City Trees, whose headquarters are in Brooklyn, and set down for its object the furtherance of proper care, planting and study of city trees throughout the country. It would urge the question on all municipal authorities, and through a local forester, tree warden, or civic organization as its representative, establish tree centers in all cities. It might also consider and recommend the adoption of uniform city tree ordinances, the publication of authentic information in city trees and the employment of a shade and ornamental tree expert by the state who would lend his services to the various cities of that state in need of his advice. I was quite convinced of the need of such an officer last summer when I received a large number of requests from outside cities asking what to do and how to start off in the care of their city trees. I assisted by personal visit a few that I could reach without loss of time and the others I could only satisfy through correspondence.

With such work as I have outlined, the wholesome effect of city trees upon our civic life would soon become a matter of general appreciation and from this feeling there would soon grow a practical knowledge of their resources and value in relation to every human activity.





STUDYING THE HICKORY BARK BEETLE IN AN
INFESTED TREE, PROSPECT PARK, BROOKLYN



CITY TREES

A STREET LINED WITH FINE OAKS,
FLUSHING, BROOKLYN



CITY TREES

A STREET IN FLATBUSH, BROOKLYN,
THE EFFECT IS ALMOST TOO PROPER AND GEOMETRICAL.



CITY TREES

USES OF A FOREST PARK,
PROSPECT PARK, BROOKLYN, ON PAGEANT DAY



CITY TREES

AMERICAN FORESTRY ASSOCIATION

Thirtieth Annual Meeting in Washington

JANUARY 12 AND 13, 1911

THE thirtieth annual meeting of the American Forestry Association convened at the New Willard Hotel in Washington on the 12th of January. President Guild presided during the meetings which were held on that and the following day.

The Secretary, Edwin A. Start, read the annual report of the Directors:

ANNUAL REPORT OF THE DIRECTORS FOR 1910

The work of the year just closed was without startling results, but it was a year of solid accomplishment in certain much needed directions.

The sudden development of the general conservation movement was somewhat confusing to the people of the United States and it is not surprising that in seeking for the real substance of a large ideal policy whose immediate and definite aims were not clearly defined, there was a certain amount of groping for bearings. This association was for a time involved in the general haziness as to ultimate objects, and the extent and importance of the work that brought it into being was temporarily lost sight of. Sober second thought, backed by the counsel of many of its wisest members, showed that it would best serve its purpose through attention in a clearly defined way to a definite object that was its own. The center and source of the conservation movement was forestry. Forestry is still the most complex and widely related of all the fields of conservation. It was through the study of forestry and its relation to the country that the whole problem of our national resources came to be understood. No portion of these resources holds a more important place than the forests. They are inseparably linked with soils and waters which depend upon them in a great measure, and as a product of the soil nothing exceeds the forest in value and in necessity to human welfare. Forests, like agricultural crops, belong to the renewable class of products and their maintenance involves much more complicated and permanent problems than the non-renewable products like minerals, oil and gas.

This could not be better expressed than in the introduction to the report of the Proceedings of the Conference of Governors in the White House in May, 1908. The editor of that report says that the germ of the idea of the conference took form in an address by President Roosevelt before the Society of American Foresters in 1903. He then quotes Mr. Roosevelt's address as follows:

"Your attention must be directed to the preservation of the forests, not as an end in itself, but as a means of preserving the prosperity of the nation. * * * In the arid region of the west agriculture depends first of all upon the available water supply. In such a region forest protection alone can maintain the stream flow necessary for irrigation and can prevent the great and destructive floods so ruinous to communities farther down the same streams. * * * The relation between forests and the whole mineral industry is an extremely intimate one. The very existence of lumbering * * * depends upon the success of our work as a nation in putting practical forestry into effective operation. As it is with mining and lumbering, so it is in only a less degree with transportation, manufactures, and commerce in general. The relation of all these industries to forestry is of the most intimate and dependent kind."

The editor of the report further says:

"With continued development of the forest policy, the interdependence of woodlands and waterways yearly became more evident; and it also became increasingly clear that

both woods and waters are in their industrial aspects closely related not only to mineral production and the reclamation of arid lands but to all agriculture and to transportation."

Therefore, we conceive the field of our association to be vital and lasting and so broad, many-sided and far-reaching as to amply justify the existence of an association dedicated to the advancement of scientific forestry for the best utilization of our forest lands for all time.

Our work is independent of that of the government but conducted in close touch with it. As an independent body of citizens we can do and say what government officials cannot do and say. Our program embodies:

- (1) An equitable system of taxation which shall not unduly burden the growing crop;
- (2) Adequate protection against fire which will reduce this greatest of forest perils to a minimum;
- (3) The practice of scientific management upon all existing forests;
- (4) The planting of all unoccupied lands which can be utilized more profitably for forestry than for any other purpose;
- (5) The whole to be brought about through harmonious adjustment of functions between the three classes of owners—national, state and private. We do not believe that either one of these agencies is to be relied upon alone. Each has its place.

Our efforts during the year have been largely directed to placing the association squarely upon this platform, and to seeking the best means of accomplishing results along these lines. We believe that a considerable measure of success has been accomplished in this direction and that the significance and function of the association is better understood today than it was a year ago. To the general movement for the conservation of all the natural resources of the country we give our hearty support, but we believe that we do the largest and most effective service by sticking closely to our text so far as our own work and efforts are concerned. Nor do we hold ourselves bound or committed in any way by the acts of other organizations, however friendly our relations with them may be. In other words, our policy must be our own, not someone else's, and we must not allow the forest interests of the country to be prejudiced or submerged by any other influences or interests.

FINANCIAL CONDITION

The year has not been satisfactory from a financial standpoint notwithstanding the generous assistance rendered by many of our members in the way of voluntary contributions. The increased cost of living has been felt in the steady increase in the cost of maintaining the simplest working organization. Notwithstanding the closest economy the year ends with a heavy deficit, and still we were obliged to curtail our activities in several directions. The closest economy has been applied to the production of the magazine, with the result that a reduction has been made in its cost while its quality, we believe, has been improved; but we have about reached the limit of economy in this direction. Any further reduction must lower the standard of the magazine and we are probably all agreed that this is our most effective instrument and that its quality should be constantly improved. Several projects carefully planned by the board last winter had to be held in abeyance or inadequately carried out on account of lack of funds. Constant development is essential to the virility of an association like ours, and the spirit of today is one of steady and rapid progress of the interests that we represent. If we do not accomplish enough, or move with sufficient rapidity, it must be remembered that it is not for lack of ideas or opportunity, but for lack of means. More members and more money are needed, and we believe that the public interest is sufficiently great to meet this need if it is fully understood so that we can go on and accomplish the great work that still lies before us.

In some ways the year has had peculiar difficulties. Among these may be mentioned that uncertainty in regard to conditions and purposes which has pervaded much of the work of development in the country and which we have endeavored to meet by making clear our program and purposes.

In seeking for members and support it has been inevitable that the organization of the National Conservation Association, appealing to most of those who are especially interested in our work should introduce a certain element of competition which we are obliged to meet. In these days of numerous organizations many people feel that they must make a choice, that they cannot connect themselves with all. We regret this, but it is unavoidable. The publication of a magazine by the National Conservation Association will introduce a further element of competition with our own magazine. To meet this we can only continue our efforts to produce a magazine, interesting, instructive, authoritative and one that will fully occupy its field—that of American forestry.

Another complication that has had to be met was that forced upon us by the ruling of the Post Office Department last year by which the membership and subscription to the magazine had to be separated. To meet this requirement the annual dues were reduced to one dollar, but it is impossible for us to publish the magazine at a subscription rate of less than two dollars, and that had be maintained. The department also ruled at that time that we could not give any special subscription rates to our members. This necessitated an entire readjustment of our list, notification to our members, and changes in bookkeeping; while the results upon the number of our subscribers and members and upon our gross income cannot yet be determined, since the full force of the requirement only goes into effect with the present year and it will be several months before the returns from the annual bills will enable us to make a final estimate.

In this last connection, it will interest our members to know that the secretary, with the approval of the president, joined with a committee representing a number of scientific organizations which issue publications to endeavor to secure a reversal of the ruling of the department, or, failing that, to secure the passage of a bill which has passed the House and is now pending in the Senate, to extend to such societies as ours equal privileges with those accorded to private publishers who are pursuing their publication for profit. We ask no special favors of the government, but we do ask that we be put upon the same plane as others and not be penalized because we are doing public work without seeking for gain. This committee had an interview during the present month with the new Third Assistant Postmaster General, Mr. Britt, and after a long discussion with him and a full and fair statement of his ruling upon the question at issue, we found that so far as our association was concerned, if his ruling had been in force it would not have been necessary for us to make the critical change that was forced upon us by what we cannot help regarding as a somewhat arbitrary ruling of his predecessor. It is perfectly evident, however, that there can be no security against such arbitrary changes under the present law, which admits of constant reinterpretation by successive occupants of the office of third assistant postmaster general, and the only safety seems to be in the passage of such a measure as the Dodds bill just referred to, which clears the matter up for all time. During the present year we shall continue our business along the lines of which the members have had ample notice and when our next annual meeting is held it will be possible to determine the results and we shall then know how the change is received by our members and what policy it is desirable for us to adopt for the future.

AMERICAN FORESTRY

Our magazine speaks for itself from month to month and calls for very little comment in this report. We have felt that it was the most important instrument of our work and demanded our best efforts and we have tried to make it influential and respected. The business embarrassments of our printer during the past year caused us no little inconvenience and many annoying delays in issuing the magazine. We have put it in new hands and, as you all know, have made some changes in the typography and style, beginning with the current volume, which we hope will commend themselves to our readers. One slight advantage will come from the separation of the subscription and membership. We can now know exactly the income as well as the outgo for the publication of the magazine, and can determine how nearly it is self-supporting and just how much we have outside of that for the general work of the association. This, from a purely business point of view, will be helpful. We hope also that this will give an opportunity for many persons who for one reason or another might not care to associate themselves as members of the American Forestry Association, but who do wish to keep informed of the process and developments of forestry, to subscribe for the magazine without subscribing to the association and its policy. It need not be added that in every case where it is possible we wish to have both members and subscribers because that is what gives not only financial but moral strength to the organization.

The adoption of the name AMERICAN FORESTRY and of a policy consistent with it has met with unvarying approval and has brought to us the willing aid of those upon whom we must depend for the material to make its pages worthy of the association that publishes it and of its purpose.

EDUCATIONAL WORK

Aside from the magazine, we have been obliged to limit our work along educational lines much more than we desired. The bulletins projected last winter were published for three numbers, when we were obliged to discontinue them until adequate resources should be available. We believe that the publication of these brief bulletins devoted to special subjects, which could be used for extensive distribution, would be of great value and that they should be established on a permanent basis. It will be possible by making regular periodical issues to secure second-class rates of mailing and the cost can be thus kept within reasonable figures.

The lecture service should be fully organized and equipped with a good outfit of lantern slides. The secretary is available now to some extent for lecture work, but with executive

and editorial responsibilities his opportunities in the lecture field are extremely limited. We need a qualified staff with some specialists available in different sections of the country so that we can make a creditable offering. Opportunities will not be wanting when we are able to supply the demands. For two years this has been an unrealized project.

For some months plans have been under consideration for a series of articles in *AMERICAN FORESTRY* of a distinctly educational character, especially adapted to the use of teachers. Beginnings in this direction have already been made and we propose to follow them up as regularly as opportunity will permit. We can do work in this direction that will supplement the work of government agencies. We should be able to put out bulletins and circulars that would be helpful to teachers and community workers in developing, not technical and professional forestry education, but popular knowledge and understanding. This we must have in all our communities in order that the professional foresters may be intelligently upheld in their work. One of the most hopeful projects for the future that we have ever taken up may be appropriately mentioned in this connection.

THE JUNIOR FORESTERS

For a year we have been considering ways and means for developing an active interest in forestry among the young people of the country. Various plans have been considered. At the same time, the same idea was put forth from another source. The National Business League of America through its secretary, Mr. Austin A. Burnham, published a plan for a juvenile organization to be known as the Tree Planters of America. It is too early to go into the details of the movement as proposed by Mr. Burnham, or the plans which we have in mind. Conferences have taken place between Mr. Burnham and your secretary, and one of your directors. Mr. Graves, the forester of the United States, has also been consulted. It has been hoped that we might undertake the engineering of the plan of the National Business League and have their valuable co-operation in the movement. In any case, it is probable that we shall undertake such an organization as a branch, or junior department of the American Forestry Association, and we hope in this way to enlist a large and enthusiastic body of young people in the forestry propaganda and in the forestry work.

SHADE TREES IN TOWNS AND CITIES

There has been a revival of interest in shade trees in our towns and cities, a revival of that interest which our ancestors showed when they planted the streets of our towns with the trees which are today the joy and pride of most of our elder communities. This revival of interest has been largely due to the study of the importance of trees both individually and collectively to our life as a people. In some of the states the state forestry associations have given much attention to the shade tree problem, and have thereby enlisted many people in their work and developed a wider interest in forestry proper than they would otherwise have done. There seems to be no reason why a forestry association should not consider the problem of the tree broadly and in all its aspects. Recently a national association has been launched under the name of the American Association for the Planting and Preservation of City Trees. To this organization and its work we certainly owe our best wishes. It has been suggested that some means of co-operation or even of consolidation should be arranged between this new organization and the American Forestry Association so that there might be a union of forces and no duplication of effort. This is a matter which needs to be carefully considered and has already been discussed somewhat between your secretary and officers of the new organization. At the present meeting of the association Mr. J. J. Levison, of Brooklyn, the forester of the new association, speaks upon the subject of "City Trees and Their Relation to Forestry," and considers this question of a city shade tree department in the American Forestry Association. We should be glad to know the sentiment of our members in regard to our share in this branch of the work.

THE APPALACHIAN FORESTS

Once again, as for many years past, the preservation of the mountain forests of the northern and southern Appalachians is a main feature of the work of the association. As is well known to most of our members, since the last annual meeting the Weeks bill, so called, has a second time passed the House of Representatives and will be voted on in the Senate on the 15th of February. In the January number of *AMERICAN FORESTRY* the present situation is stated as clearly as is possible, and we do not need to add anything to it. The source of the antagonism which has prevented the passage of this beneficent legislation, notwithstanding the widespread demand and the character and influence of the individuals and organizations all over the country which have asked for it, remains a mystery. If we knew the source of this opposition, it would be easier to meet it. Every

effort has been made by the congressional opponents of the project to adduce testimony unfavorable to the known effects of the forests upon streamflow and the protection of mountain sides. But it has not succeeded in shaking the consensus of the best scientific opinion of the world. This measure is a project of vital importance to the nation at large and not solely to the sections in which the mountains lie. It represents a definite feature of a national policy upon which we have already embarked and which we must round out to its full perfection before we can be secure in our future prosperity as a nation. The failure of the bill in the present congress would be a national calamity, and every effort should be brought to bear to secure favorable action by the Senate of the United States on the 15th of February. No course which would result in a conference and a dead-lock between the two houses so that the bill would fail to become a law before the expiration of this congress should be tolerated by the country. The popular demand for this has been made in unmistakable terms and the people should insist that their just demand is met. So far as the American Forestry Association is concerned this task will never be given up until it is accomplished and when the law which makes a beginning has been enacted we shall use every effort in our power to secure the accomplishment of its full results in the development of a public forest system in the east.

MISCELLANEOUS

The usual routine work of the year has been carried on, correspondence from the office, attendance upon meetings of other organizations and speaking by your president and your secretary.

The secretary attended the biennial meeting of the National Federation of Women's Clubs at Cincinnati, in May; the opening of the Forest Products Laboratory at Madison, Wisconsin, in June, an interesting and important occasion; the annual meeting of the Society for the Protection of New Hampshire Forests, with which we have been brought into the closest association through the common interest in the Appalachian-White Mountain forests, in August; and the meeting of the Second Conservation Congress at Saint Paul, in September. We hope to have the association represented at the Canadian Forestry Convention at Quebec next week. This convention is to serve much the same purpose in Canada that our American Forest Congress did for us in 1905.

It has not been possible to do as much of this work as is desirable. We believe that great advantage comes to the association and to its work from the contact of its representatives with other organizations having kindred or sympathetic interests and it is desirable that the secretary should have more time at his disposal than present conditions permit and more means available for traveling expenses.

The secretary of the Canadian Forestry Association, Mr. James Lawler, visited the United States during the summer and made a study of some of our forestry methods and of the plans and working of our forestry associations. He spent a few days in Washington and expressed himself as much interested in the work that our association is doing. This visit, and the spirit in which it was made, are most gratifying, and will increase the cordial relations already existing between these two national forestry organizations.

Owing to the changed methods it is impossible to give exact figures at the present time in regard to our membership. It has very nearly but not quite held its own during the year. For the coming year we shall, of course, have three classes—members, subscribers and those who are both members and subscribers. It is gratifying to report that so far as we may judge by returns thus far from the annual bills, the third class will be very much the largest of the three.

Respectfully submitted for the directors,

EDWIN A. START,
Executive Secretary.

CITY TREES AND OTHER TOPICS

The next order was the presentation of a paper by J. J. Levison, of Brooklyn, N. Y., forester of the Brooklyn and Queens Park Department and of the Association for the Planting and Care of City Trees. His subject was "City Trees and Their Relation to Forestry." This paper appears elsewhere in this magazine. Following this was an address by Henry S. Graves, Forester of the United States, which also appears on another page.

Philip W. Ayres, forester of the Society for the Protection of New Hampshire Forests, was the next speaker. He described the situation in the White Mountains as one of progressive permanent destruction. He spoke of existing conditions and their causes and made an appeal for work in behalf of the proposed Appalachian legislation. He urged the danger of amending the bill

so that it would be thrown into conference and quoted John Hay as having said that a very few people joining together in the United States Senate can kill almost anything. He closed by saying, "Therefore I urge that every patriotic citizen throughout the length and breadth of the land who believes in the future timber supply of the Appalachian chain, north and south, shall get letters from influential people in each senatorial district in the United States to senators to urge that the bill for this purpose known as the Weeks bill shall pass at this session of congress."

F. W. Rane, state forester of Massachusetts, spoke of recent developments of forestry in that state. He described the reforestation work which is being done. The state lends money to the state forester whereby he may take up lands and set them out with trees. Title is turned over by the attorney general to the state forester and these lands are set out, a ledger account being kept of the cost of labor, seedlings and transplants, and the owner may redeem them at any time within ten years by paying the absolute cost, plus four per cent upon the investment, to the state. The state thereby is simply loaning money in order that we may build up our waste lands and bring them back into forests. We have in Massachusetts like many other sections of the country a natural forest country. Taking these natural conditions with the assistance of simple forestry we can bring about wonderful results. Mr. Rane discussed also the question of forest fires, describing the personal work which he had done to secure competent men for forest wardens in the several towns of the state. Meetings are held in different sections of the state to which the expenses of the wardens are paid. These meetings are for the purpose of instruction and discussion. This year there is a bill before the legislature to regulate the handling of slash.

S. N. Spring, state forester of Connecticut, followed Mr. Rane. He spoke of the forest fire problem as one of the chief problems of Connecticut. The laws are somewhat similar to the laws of Massachusetts, and the principal work of the forester during the first year after he is in charge has been in bringing that service to a greater state of perfection. The other thing which has been foremost has been the laying by experimentation of a sure foundation for the practice of forestry. The experiments have been along the lines of the handling of woodlands. This was essential for the complete regeneration of the forests of Connecticut because of their worn out condition through constant cutting and in view of the encroachment of disease. Mr. Spring said that he had made arrangements to give special study to the chestnut bark disease. There is no known treatment thus far for this disease and it is probable that if it extends as it is extending now most of the chestnuts in the state will be killed. Something must be done to replace the chestnut and the only possible solution the speaker sees is for the state forester to take over a section of badly injured land and start at once experiments which will give results for the use of the people in the state. The speaker expressed his belief in the dominating importance of educational work and said that he was not so keen on legislation as the forester of Massachusetts but that he was keen on developing experiments, the results of which will give us something definite on which to work.

E. A. Sterling, forester of the Pennsylvania Railroad Company, described the work of that company in planting and in protecting water properties which are held around the company's reservoirs. Much is being done also in wood preservation. Creosote plants have been built and ties and timbers creosoted. This work is not new in the west but it is rather new in the east. Judging by the results on the western roads and abroad it is believed that the life of cross ties will be increased by one-third and in some cases doubled.

Trestle timber, piling and timbers of that kind will have their life increased indefinitely. Another important element in the preservation of timber is in the ability to substitute inferior wood for the more expensive and scarcer woods. For instance, short-leaf pine, if creosoted, is just as good for trestle timber where no great strength is required, as oak timber, and black oak tie is as good as white oak if creosoted. Through our local territory in Pennsylvania we have been able to use quite large quantities, both of birch and maple, which have practically no local use except for implements, and to greatly increase our local output and at the same time utilize those trees. Another thing which we are doing is the management of small woodlots on water properties. The forest conditions vary all the way from absolute barrenness up to very good timber and on some of these properties logging has been carried on under the most intensive practice in the state. In one case on a property of a thousand acres, perhaps six or seven hundred thousand feet of second growth hardwood and a little pine was cut in a way which left it looking better and in better condition and we have been able to net a very nice profit from it. The speaker referred to the sometimes disappointing attitude of the lumbermen in the matter of practicing forestry and said, "We all know why he does not and I do not know that we blame him for not cutting down revenues for the sake of practicing forestry, but I am coming to the conclusion that the big timber consumer is in a position to do something along this line that he can perhaps do better than the lumberman. In the face of constantly increasing prices there is no other method in sight unless they take the matter in their own hands and acquire their own timberlands and manage them on long time for their own use."

The afternoon session closed at a little before five o'clock. In the evening a number of members of the Association availed themselves of an invitation to attend the meeting of the secretary of American Foresters, which was held as usual at the house of Mr. Gifford Pinchot.

FRIDAY MORNING

The first order at the Friday morning session was the annual address of the President of the Association, Hon. Curtis Guild, Jr. This is printed elsewhere.

A paper was presented by Professor Herman H. Chapman of the Yale Forest School on the subject, "Shall the State Regulate the Cutting of Timber?" This paper is printed elsewhere in the magazine.

Commissioner Conklin, of Pennsylvania, had been present during the Thursday session but was called away and Dr. J. T. Rothrock, who is always welcome to the American Forestry Association, spoke for Pennsylvania. He urged the importance of preserving the Appalachian forests as a nursery of men; called attention to the part which the whole Appalachian region from Maine to Georgia has played in the history of the country, and urged the loss which it would be to the country if the forests were swept away, the soil washed out and this brave people reduced by poverty to the depths of degradation until they have reached the very last round and instead of the strong armed and the strong hearted men who have always been the support of the nation in time of trouble, we have a degenerate race.

Dr. Rothrock spoke of several important phases of the forestry policy of Pennsylvania which now has over 900,000 acres of state forests and has built 2,500 miles of road and fire lines. "We have," he said, "an output from our nurseries of about 1,500,000 trees annually and to these may be added from five hundred thousand to another million which are planted, making an average of two million, five hundred thousand trees planted in the state reser-

vations. About fifty square miles of territory have been examined with regard to the chestnut plague. The forest service has been assisted in making a reconnaissance survey of the Ohio watershed. They are now proposing to bring up again the idea of auxiliary forest reserves in which the land and the contents of the soil beneath shall be separately taxed.

An interesting summary was given of the forestry educational work in the state. Dr. Rothrock referred first to the state forest academy at Mont Alto, to which ten pupils are admitted each year. He described the system under which a trained body of foresters for the state service is thus being built up at the cost of the state, but to its ultimate profit. Estimating the work done by these young men during their last three years in the school and on the reservations after graduation at the full value of trained labor, the state of Pennsylvania in conducting our forestry work has actually gained money by their education. About three hundred dollars is the profit to the state on every man who is turned out. It seems to me, said the speaker, that this is a common-sense plan and worthy of commendation and should be followed elsewhere. He also indorsed the work of the forestry school of the State College and referred to Lehigh University, as having started on a career of public education. The course of lectures that has been inaugurated there and continued for several years has diffused forestry knowledge and forestry interest throughout the whole surrounding country. "When we consider," he said, "that there is hardly an occupation, hardly a business interest, hardly a thing connected with our life history into which forestry does not enter, the importance of enlarging upon this theme seems to be apparent. I cannot too fully approve and endorse the work that is being done by Lehigh University. I would like to see not only every college in the land adopt to the extent of its opportunities such a course, but I would like to see it carried into every public school in the land."

At the close of Dr. Rothrock's remarks, the president appointed to act as escort to the President of the United States at the dinner in the evening, Dr. Henry S. Drinker, president of Lehigh University, and Mr. F. W. Rane, state forester of Massachusetts.

Mr. Ayres reported for the nominating committee (Philip W. Ayres, James W. Toumey, and F. W. Rane) and the report was accepted and the officers for the coming year were elected as follows:

President, Curtis Guild, Jr., Massachusetts; vice-presidents, Joshua L. Baily, Pennsylvania; Charles W. Eliot, Massachusetts; B. E. Fernow, Ontario, Canada; W. W. Finley, District of Columbia; David R. Francis, Missouri; Rutherford P. Hayes, North Carolina; George Foster Peabody, New York; J. E. Ransdell, Louisiana; J. T. Rothrock, Pennsylvania, and Albert Shaw, New York; treasurer, Otto Luebker, Washington, D. C.; and the following directors: Robert P. Bass, New Hampshire; Herman H. Chapman, Connecticut; Curtis Guild, Jr., Massachusetts; Austin F. Hawes, Vermont; John E. A. Hussey, Massachusetts; Otto Luebker, Washington, D. C.; Chester W. Lyman, New York; George H. Maxwell, Illinois; Charles Lathrop Pack, New Jersey; Thomas Nelson Page, Washington, D. C.; Charles F. Quincy, New York; Cuno H. Rudolph, Washington, D. C.; Ernest A. Sterling, Pennsylvania; Frederick S. Underhill, Pennsylvania, and Robert S. Woodward, Washington, D. C.

A motion made by Mrs. F. W. Gerard, of Connecticut, and seconded by Mr. W. L. Rice, of Philadelphia, was adopted to the effect that the members of the association be given an opportunity to pledge themselves to secure each five subscribers for AMERICAN FORESTRY during the coming year. This was suggested as a practical means by which each member might not only assist the association financially, but extend the circulation of its magazine and



HON. CURTIS GUILD, JR.

ELECTED FOR THE THIRD TIME PRESIDENT OF THE AMERICAN FORESTRY ASSOCIATION



Photo by Harris & Ewing

ANNUAL DINNER OF AMERICAN FORESTRY ASSOCIATION, 1911

AT HEAD TABLE, READING FROM LEFT TO RIGHT: DR. R. S. WOODWARD, PRESIDENT OF CARNEGIE INSTITUTION, CUNO H. RUDOLPH, CHAIRMAN OF COMMISSIONERS OF DISTRICT OF COLUMBIA; REV. U. G. B. PIERCE; REPRESENTATIVE JAMES R. MANN; SENATOR HENRY CABOT LODGE; HON. CURTIS GUILD, JR., PRESIDENT OF THE ASSOCIATION; DR. THOMAS NELSON PAGE; SENATOR CARROLL S. PAGE; SENATOR DUNCAN U. FLETCHER; HENRY S. GRAVES, FORESTER. PHOTOGRAPH TAKEN BEFORE THE ARRIVAL OF PRESIDENT TAFT

thereby aid its educational work. Remarks were made by Joshua L. Baily, of Philadelphia, A. R. Eastman, of Waterville, N. Y., F. W. Kelsey, of Orange, N. J., and others. The president urged the necessity of an active support of the Weeks bill to the end that it might be passed by the Senate unamended so that it would become a law.

THE ANNUAL DINNER

The annual dinner Friday evening in the red room of the New Willard was attended by about seventy-five members and guests. The room and the tables were beautifully decorated with palms and cut flowers, especially noticeable being a magnificent bank of American Beauty roses on the speaker's table. At that table were President Guild, Senators Lodge of Massachusetts, Fletcher of Florida and Page of Vermont, Representative Mann of Illinois, Commissioner Rudolph of the District of Columbia, Forester Henry S. Graves, Dr. Robert S. Woodward, president of the Carnegie Institution, and Dr. Thomas Nelson Page, and, upon his arrival at ten thirty o'clock, the President of the United States. The report of the committee on resolutions was presented by Mr. Maxwell before the speaking and was unanimously adopted. The resolutions are printed on another page.

The first speaker was the Hon. Henry Cabot Lodge, senior senator from Massachusetts. Senator Lodge spoke earnestly and, in view of the pendency in the body of which he is an influential member, of the Appalachian bill, to which he referred, his words were listened to with peculiar interest. He expressed the opinion that the two public questions of more importance than any others are those of the quality of our citizenship as affected by immigration and the conservation of our national resources. "In the latter forestry is the largest element." Of the Appalachian bill, he said, "I feel a very profound interest in that bill, as I am one of the committee which reported it. I hope that we shall pass it at this session on the 15th of February. We shall certainly have a vote on that day because the vote has been fixed. I believe from the vote by which the bill was taken up, as I recall it, forty-eight to sixteen, that we have an ample vote to pass the bill, but the great danger of the bill—and it is one of which every friend of the legislation should be informed, is an amendment. I do not care what the amendment is. Any amendment which sends that bill back to conference endangers its passage, and if it does not pass at this session having proceeded so far, it is difficult to say when we can pass it.

"I need not enlarge upon the importance of this measure, of how much it means to the water power and to the welfare of New England and of the Carolinas and all that tier of southern states. I think we may take that as proved, and I do not think I am advocating it from any merely local interest. I voted, and voted with pleasure, for what was known as the Arid Lands bill, which put by the sales of those lands, I think, some thirty-five million dollars into the process of their further development. Of course the sale of these lands which belonged to all the people of the country was the money of the people of the country at large. It fell to me last session to report and carry through the Senate the bill which authorized a loan of twenty million dollars for the purpose of still further carrying on the work of irrigating the arid lands. I did it with great satisfaction. All this is of no immediate interest to the people whom I represent, but it is of value to the whole country, and I am sentimental enough to believe that what is of value and what is of profit to these great states in which the arid lands lies is of great value to New England and to Massachusetts, and in the same way I believe that what is of great value to Massachusetts and New England and the Carolinas, and to Virginia, is of

great value to the rest of the country. It is, therefore, in no narrow or local spirit that I urge the passage of the Appalachian Mountain bill. It will do much in my judgment to preserve the waterpower sources in all that region which it covers. The bill is carefully drawn and carefully guarded, so that it can put no undue burden upon the United States, and I believe it will be of immense value and advantage to the people of the United States and another step in the preservation of our forests.

"That is the bill immediately pending, but the question of the preservation of the forests is one that is with us every year and is a much larger question. It is one that requires the constant attention of all who believe in it, of all who see in it, as I see in it, questions affecting the welfare of generations yet unborn. And therefore, with a view to that larger future which we hope stretches before our great country there is nothing in my judgment more patriotic, more deserving of the support of all patriotic men and women, than to uphold and promote in every way intelligent legislation for the conservation of the natural resources of the United States."

In introducing the next speaker, President Guild said: "The juxtaposition of the first and the second speakers of this evening is a happy augury for our cause—Massachusetts and Virginia. The American Revolution started in Massachusetts, but the leader came from Virginia, and it was by the vote and at the request of Massachusetts that the great land owner and soldier of Virginia was set at the head of the Continental army, which represented the Old Thirteen. You have heard from Massachusetts. You are to hear from Virginia. You have heard from American statesmanship. You are going to hear from American literature, and it is with the greatest possible pleasure that I introduce to you our new director, one whose name is known far beyond the limits of the United States. I take deep pleasure in presenting to you Mr. Thomas Nelson Page."

Mr. Page's paper was distinguished by breadth and sanity of judgment, by fine appreciation, and by the high literary quality characterizing all the work of this eminent author. It will be published later in *AMERICAN FORESTRY*. Following Mr. Page's address, the President of the United States was announced and entered the room while the orchestra played the Star Spangled Banner, and the company arose and gave the chief magistrate of the nation a cordial welcome.

In greeting the President, President Guild referred to the representative character of the audience and to the wide reaching influences for which the company stood. He thanked the President for his interest in the cause represented by the association, for the appointment that he had made of a forester in the person of Mr. Graves, and voiced the respect and love of those present for the President.

The President said that he was here for two purposes. To testify to his interest in forestry, and to repay a debt he owed to the chairman. Of the latter he said: "I induced him to go to Mexico to represent this country. He did not know the language they use in Mexico, but he had notice enough—two or three months—to learn it. When he went down he took charge of things just as he has tonight and he was the whole show. He led all the foreigners, made them feel at home and gave the Mexicans to understand how we really appreciated their hospitality." The President disclaimed any intention to make a speech on forestry. He referred to the national forests as representing about 25 per cent of the forests owned by private persons. He said that it was discouraging to think of reforesting all the land that ought to have forests in the United States. "It is a task that does not address itself to Americans because when we project a thing one day, we wish to see it well developed the

next morning. It is a task that appeals rather to the thorough German or to the patient Frenchman—for he is patient in the country. But we have got to come to a knowledge of the fact that we are growing to be an old country, with the responsibilities of an old country and that we have got to abide nature's way in doing the things that we ought to do if we seek the aid of nature in restoring that which we have extravagantly wasted." He made the point that everything must not be expected from the central government of the United States and that it is the business of the states to provide foresters and forest services. In this connection he said that there are "some states that can teach the United States a great deal about what ought to be done for forestry. They are spending lots of money in Massachusetts and in New York, but there are a good many other states where they ought to devote more time. They are younger, they do not realize the responsibilities that are upon them with respect to the development of the tree industry. Still," he said, "it is not for me to lecture the states. I have got enough to do looking after the central government as long as that responsibility is mine, and all I can do is to promise this company whose general interest in the matter is most gratifying, that we are going to do as much as we can to develop everything we can in the matter of forestation as long as I have anything to say about it, and I haven't a bit of doubt that those who follow us will continue in the same path." He referred to the great things done by the government in sanitation in Cuba and Panama as an example of the way in which the apparently impossible may be accomplished.

The last speaker of the evening was the Forester of the United States, Mr. Graves. His address is printed in full on another page. Following his remarks, President Guild, with a few appropriate words, brought the thirtieth annual meeting of the American Forestry Association to a close.

TWO ADDRESSES

By HENRY S. GRAVES

FORESTER OF THE UNITED STATES

(Delivered to the American Forestry Association, the first at the afternoon session, January 12; the second at the dinner, Friday evening, January 13.)

THE FORESTRY PROBLEM OF TODAY

REPRESENTATIVES of this association gather here every year to discuss problems of forestry, and to report on the progress of forestry during the year. This year we can report, as in previous years, that there has been a great advance. As I have been about the country, it has been perfectly clear that there never was before so great an interest in forestry, nor so intelligent an understanding of its purposes and methods. Not only has there been a great extension of the interest in the general problems of forestry, but there has been accomplished a great deal in the work of actually introducing the practice of forestry in handling woodlands. I say this, in spite of the great losses during the last season by forest fires. This was the first year that there was a systematic effort to control forest fires on a large scale during a season of great drouth. There is a saying that once in so often a forest will be burned over and destroyed, and that no matter what is done in the way of protection, the forest sooner or later will be burned. The origin of this saying may be sought in the past history of fires. During previous periods, when there was no attempt to protect forests, there were fires here and there every year, some burning over large and some over small areas; and then occasion-

ally there was a combination of conditions specially favorable to fire—extreme drouth and high winds—when the forests became excessively inflammable, and when there were great conflagrations. These occasional conflagrations have occurred from time immemorial, and they have destroyed vast areas of forest. This last year there was such a combination of conditions. In the far west the season was the driest ever known. In spite of the great interest in forestry, in spite of the almost universal desire to prevent fires, there were in the national forests alone about five thousand fires during the season. Most of these were extinguished promptly by the organization, with relatively small loss. The great loss caused on the national forests was by only about fifteen per cent of the fires.

The occurrences during the past season furnish a clear demonstration, not that the government can not protect its forests, but that with means provided for their proper organization and patrol the forests can be rendered safe.

There has been also a great advance in forestry throughout the individual states. In those states in which there has hitherto been little legislation, and little active work in forestry, there has been during the year a very much increased activity. In those states in which there has already been an effort in public forestry matters, there has been an immense progress in the development of the practice of forestry on the ground. This is work about which the general public does not hear very much, but it is work which counts tremendously. The work which State Foresters Rane, of Massachusetts; Hawes, of Vermont; Ayers and Hirst, of New Hampshire; Spring, of Connecticut; Pettis, in New York; Gaskill, in New Jersey; Besley, in Maryland; Griffith, in Wisconsin, and others are accomplishing, deserve a special public recognition. It is the development of forestry along practical lines and getting the owners of woodlands to introduce its principles.

The progress in forestry during the last year on private lands has been very encouraging, not only on the small woodlots of farmers, but on larger holdings. The larger owners are beginning to associate themselves together for mutual protection from fire, and there are today a number of very effective forest fire protective associations, notably those in the northwest, Washington and Idaho; and I understand that there is prospect of similar association in Oregon. Recently an association has also been organized in New Hampshire.

The problem of forestry is peculiar, in that it takes a long time to produce a crop of trees, and forestry does not appeal to the average owner of timber land, who has purchased his property for the merchantable timber upon it and not to grow trees.

The problem of forestry is essentially a public problem. The purposes of forestry—to secure a closer utilization of the products and to prevent waste, to secure a continuous production of timber for future use, to secure those advantages of the forests which pertain to the protection of our rivers, the protection of the mountain flows, and for public recreation—are of vital public importance. They should be guaranteed by the public, for the problem is one which should not be left altogether to private individuals. The problem will not be solved by the private individuals, if it is left to them. It is true also that the burden of working out that problem should not be placed on a single class of private individuals. The benefits of forests are public. The responsibility of bringing about forestry rests primarily on the public, and the burden of forestry should be shared by the whole people who enjoy its benefits.

The national forests are already under management. Their efficient administration and adequate protection depends on the support given by the public.

It is comparatively easy where most of the timber lands are owned in large holdings by few individuals for them to associate together in associations for protection from fire. Where there are a very large number of owners that is exceedingly difficult. The protection of small private forests depends on organization. There must be a development of the forests similar to that required on large forests; and there must be the same kind of efficient patrol.

It is, in my judgment, therefore, essential for the individual states to aid the organization of the work of fire protection on these private lands. A private owner must assume the responsibility of ownership of a natural resource, but private owners should be given that assistance in fire protection and solving the problem of taxation, which is necessary to enable them to practice forestry at all.

I would therefore urge the importance of a public appreciation that forestry cannot be accomplished unless the public gives its support; and in developing forestry it is not sufficient merely to pass laws, although that is better than nothing, but it is necessary for the public to give its support and appropriate money enough so that the forests can be properly organized and patrolled and forestry actually brought into practice.

THE HISTORY AND PRESENT TASK OF THE AMERICAN FORESTRY ASSOCIATION

At a meeting of this character it is natural at least for the older members of this association, to recall, by contrast, some of the incidents of the earlier days in the history of the association. Perhaps many of you do not know that the American Forestry Association is nearly thirty years old. It was founded in 1882, and during the earlier days the principal activities of forestry in this country were centered about this organization. Without any question it had a great deal of influence in preparing the way and laying the foundation for the extraordinary development of forestry of later years. It is a fact that in every country forestry has not been established except through the efforts of the government. That is also true in this country for the real work of forestry had its real beginning when the national government took hold and began to develop a national forest policy. It was not until 1896 that such a policy was initiated. At that time Congress considered the question of how our forests should be handled, and as a result there were set aside by President Cleveland many million acres as forest reserves. This brought forth a tremendous opposition, so great that these reserves were suspended for a year, until the people could be made to understand their real purposes. I believe that the very opposition to this policy gave the stimulus to the interest in forestry which resulted afterwards in the development of a thorough-going policy in national forestry.

It is a great contrast, as I come back to the government service now, to compare the conditions with those obtaining twelve years ago, when I was serving in the Division of Forestry. There was then but a handful of trained foresters in the country, now there is a well developed profession of forestry; there is now an established national forest policy, and public sentiment which has declared itself emphatically in favor of national as well as general forestry. I find that, contrary to the general belief, not only is there a favorable public sentiment in relation to forestry in the east, but that the people at large in the western states are in favor of the national forest policy, and they are uniting in co-operation with us to aid us in the effective administration of the national forests.

It is natural, in view of this widespread favorable sentiment to forestry, to believe that the work of this association and other agencies, promoting the propaganda of forestry, is about done. Yet, in spite of this public sentiment,

we have suffered from forest fires during the past season far more than the average. While we see a constantly increasing number of men who own forests, introducing the practice of forestry on their lands, and a constantly increasing number of men planting trees on their waste lands; and although all the timber on the national forests is cut under the methods of forestry, it nevertheless is a fact that only one to two per cent of the lumber on the market today has been cut under the principles of forestry. This means that there is a tremendous work before us in the actual work of introducing the practice of forestry on the ground.

There is a tendency to feel that as soon as a policy is established, the work is done. As soon as the organization of the forest service was accomplished, it was believed that the fire problem was solved. No greater mistake can be made for we have before us a tremendous work to develop these forests and to make the protection from fire possible. Many of them constitute a vast wilderness, undeveloped and without the means of transportation and communication which are absolutely necessary for fire protection. We have determined that it will cost at least eight million dollars to develop the roads and trails, telephone lines and other equipment necessary for the primary control of fires. When that is done and there is an adequate patrol provided we can guarantee the safety of the national forests, and not until then. When we realize that the national forests comprise only a comparatively small portion of the forests of the country, we must understand that there is a great work to do aside from the work of the government on its own lands.

The duty of the national forest service extends far beyond the administration of the public forests. The government must take the leadership in the development of the science and practice of forestry throughout the country. It is impossible for the government or for the individual states, to do all of the work which is necessary to bring this about. The states must provide also their local forest services. They must make it possible through aid to private owners in fire protection and in solving the problem of taxation, to practice forestry on private lands.

There must, however, be an immense amount of educational work; and that is the function of associations of this kind. I believe myself that this association may be made a great educational instrument to aid the government and the states in extending knowledge of forestry throughout the entire country; that this central association should extend its influence, combining with state associations and all other educational agencies to aid in the education of people to the necessity of forestry and to teach them how to practice it.



RESOLUTIONS

(Adopted at the Thirtieth Annual Meeting of the American Forestry Association.)

WHEREAS the American Forestry Association stands distinctly for the agencies national, state, municipal, and private which are working for conservation and perpetual renewal of our forests, and for those agencies national, state, municipal, and private which are working for that end; and in view of the subjects especially presented at this thirtieth annual meeting of the Association, *be it resolved*:

(1) That we call the attention of all friends of forestry to the necessity for active and earnest work to secure the final passage, without alteration or amendment, on February fifteenth next, the date set for a vote in the Senate, of the White Mountain and Appalachian National Forest Bill, known as the Weeks Bill. This nation can no longer afford to ignore the warnings afforded by the results of the destruction of forests on the headwaters of streams where depopulation has followed the devastation of the forests in so many of the older countries of the world.

(2) That it is of the utmost importance to stimulate interest in forestry in the younger generation in every way possible; for example, by providing lectures in our schools with the co-operation, wherever practicable, of state forestry officers and associations, and by offering prizes for essays, or for tree culture and plantings.

(3) That this association urges the institutions of higher learning throughout the country, our colleges and universities, to become centers for the diffusion in and throughout their respective localities and spheres of influence, of a knowledge of the vast importance of our forest problems to every citizen, and their vital relation to the industrial and business development of our country, and its commercial prosperity.

This work does not require the organization of departments or schools of forestry in such institutions. What is needed is some authoritative, intelligent direction by local public lectures, by college extension work, or otherwise, of the thought and attention of our people at large to this subject.

The value and practicability of this has been demonstrated by the results obtained during the past two years at Lehigh University under an endowment made especially to sustain such work at that university.

(4) That this association earnestly appeals to men of means throughout our country to support this educational movement for the benefit of the people at large. Comparatively small endowments of money will bring about results of the above character of great value and practical efficiency.

(5) That the states should encourage private forestry, by extending the facilities for popular information on forestry subjects, by establishing demonstration forests, and especially by improving the system of protection from forest fires, and by reforming the laws on forest taxation. That they should inaugurate the policy of buying land requiring a perpetual forest cover, and of managing such land by the state as an owner, with all the rights of an owner. That they should enforce a reasonable degree of regulation on lands where the indirect influence of the forests on streams and erosion is clearly proven, but they should put the interpretation of such regulations in the hands of a qualified forester, with the power, and with sufficient assistance, to insure full enforcement.

Every state where such conditions maintain should have a state forester technically qualified for his position.

(6) That this Association makes an earnest appeal to Congress to give increased appropriations to provide adequate protection of our national forests from fire, and to secure their best administration and development, and strongly recommends that the several states provide ample funds to carry out their forest policies along broad lines.

(7) That the president of the association, the Hon. Curtis Guild, Jr., be requested to epitomize the very able, comprehensive and instructive address presented by him at this annual meeting into the form of a memorial in behalf of the White Mountain and Appalachian national forest bill, which the board of directors are requested and instructed to forward to the President, and to the members of the House of Representatives and of the Senate of the United States.



EDITORIAL

NEW OCCASIONS TEACH NEW DUTIES

THE forest commission believes that it has brought the tree interests of the state to a point where it is necessary to go forward more rapidly or to risk drifting slowly backward."

This quotation from a journal in an eastern state suggests a condition which comes inevitably in every forward movement. The first steps of agitation are comparatively easy. They seem difficult indeed to the pioneers in a movement, but those who have been through the experience know that the fresh enthusiasm of a new enterprise, working with elementary and comparatively obvious facts, has a much easier task to arouse the people to make beginnings than when it becomes necessary to settle down to the steady, long pull which is demanded for ultimate successful accomplishment. Then there must be patient, scientific examination of actual conditions. The easy oration and generalized appeal to patriotism have done their work and must be laid aside for less pyrotechnic labor. This is particularly difficult for the American people. Their energy and enthusiasm, especially for a new thing, are boundless; but it is not easy for them to give the patient and persistent study and careful development to a great problem in which the German and the Japanese excel. President Taft expressed this tersely at the American Forestry Association dinner, when he said that we want to begin a thing at night and have it done the next morning.

How common is the story of apparently brilliant success in the first stages of a movement, success that fires the workers with enthusiasm and inspires popular interest. And how difficult it is oftentimes to live up to this apparently brilliant record in the later stages of the same movement. The real danger point of any institution or organization for progress is the possible dead center which it reaches when the popular interest ceases to be fired by striking achievement, but when the real solid work has to be done and patience, knowledge, and training are wanting in the leaders. We have a way of settling back and resting on our oars after a brief spurt which very often endangers a race.

This generalization applies in a marked degree to the whole forestry movement and to all the organizations connected with it, not only in the state from which the journal above quoted comes, but throughout the whole United States. A wonderful work has been done in the last twenty years, a work that compares favorably with the achievements in forestry in any country in the same length of time. But now we have reached the point when we must study this great problem in all its detail; when we are meeting practical difficulties of its application to the conditions of business and of every-day life; when many of the accepted methods of our people must be overturned in order to develop forestry along the widest and most successful lines for the good of the nation at large. Now is the time, if ever, when every individual citizen of the United States who cares for the success of the forestry movement should lend his whole support to the governmental agencies and to those organizations which are striving to develop the work of the pioneers into a complete and finished product.

Fortunately we have leaders of capacity, men of scientific knowledge, technical training, enthusiasm, patriotism, and the power of leadership. We have, too, considerable bodies of earnest citizens eager to know and willing to help. We have also dense ignorance in high and low places, self-interested hostility to the common good, and the characteristic American impatience with constructive policies that demand for their fruition infinite pains and long periods of time.

The first of these groups is arrayed against the last and popular education holds the key. In his spirited and thoughtful address at the annual dinner, Mr. Graves laid this task of popular education upon the American Forestry Association as the one which it is especially called upon to do to hold up the hands of the able professional body the country is developing. No finer tribute could have been paid to the twenty-nine years' history of the organization. The task should be accepted with some pride and much humility as a great, necessary, and worthy work.

THE PRESENT SITUATION IN THE WHITE MOUNTAINS

IF ANYTHING is needed to show why those who know the White Mountains and have studied their relations and influence upon the eastern United States are almost passionately desirous of the salvation of their forests it is to be found in observation of existing conditions.

Clean cutting of spruce continues throughout the White Mountains without cessation. Five new log railroads have been constructed within the last two years into the upper valleys and are now in operation. One after another these valleys are cleaned out. The work extends from them up the steep mountain sides higher and higher year by year. The method of cutting is the most destructive possible and the waste is excessive. Millions of young trees, too small for use in the pulp mills, are felled and left on the ground to decay, merely that the larger logs may be removed more easily. The Swiss or the Germans would not for one moment permit cutting of this kind on high slopes. They would use a selective method, by which the mature trees would be taken and the young forest left to hold the soil and regulate the run-off of water. Nothing except the forest will hold back the soil from erosion, and nothing except the forest and the porous soil prevents the water from running off the steep, bare rocks in torrents alternating with droughts.

Fire during the past year has burned over 25,000 acres in the White Mountains, which is far less than in preceding years. In one year, 1903, 84,000 acres were burned over, and the number of acres burned in the White Mountains as a whole now amounts to 250,000. After a fire, almost invariably erosion follows. Large areas have been crippled and there are considerable tracts which will never again produce commercial forests. Upon some of these the large charred stumps and dead logs still remain, where fire and erosion have rendered the land beneath them forever barren. Here no forest can ever take the place of that which has been cut off.

In the last ten years there has been a distinct change in the general aspect of the White Mountains, so that one who has been familiar with them can see the progressive and permanently evil effect of fire and erosion. It is probably not too much to say that at no time in history, and at no place on the globe, has mountain soil ever been injured and rendered unproductive so rapidly as in the White Mountains. In China and in Spain the destruction must have been far more gradual. With the energy characteristic of American enterprise, a single generation suffices to produce a change not only in the aspect of the White Mountains, but also in many places a profound change in the

nature of the growth, for where fire injures the soil the forest cover is distinctly changed. Undesirable and useless species like the bird cherry often cover the land, and it may be from one to three centuries on crippled soils before it is possible for a spruce forest to get footing again.

The reason for this great change is found in the fact that during the last twenty years about \$29,000,000 have been invested in northern New Hampshire alone in the paper and pulp industry and in New England \$140,000,000; but one must not hold the papermakers to blame. It is not reasonable to expect them to donate the land and forest for the sake of other economic interests. The problem in the Appalachian Mountains concerns all of the eastern states; its interstate character and its bearing upon navigable streams makes it a problem for the Congress of the United States.

How long shall we—a rich and powerful people, with all the knowledge of modern science and all the resources of modern engineering at our command, and with the experience of older and less enlightened countries for a warning—how long shall we suffer this to be without applying the necessary and obvious remedy, the remedy that wiser people have already applied?

TO SAVE THE CRAWFORD NOTCH

IN DIRECT line with our comments last month on the noteworthy progress in New Hampshire in forestry is the movement now on foot to secure the purchase by the state of the Crawford Notch. No action would give better proof of the good faith of the state in its advocacy of national ownership of the central White Mountain region. We have always held that a considerable part of this problem of forest preservation must be worked out through state ownership. New Hampshire now has a state forest service under competent direction and is in a position to undertake the ownership and management of forest land for the general benefit. To say this is in no wise inconsistent with the proposition that there is an opportunity and a duty for the national government in this mountain country. The interstate relations of the region create conditions there for which one state should not be held solely responsible, and the whole problem is one of too great magnitude for a state with the means of New Hampshire to handle alone. As has been urged before in these pages, a problem of this kind is one which involves the co-operation of nation, state, and private owner.

The opportunities for the establishment of state forests are numerous throughout New Hampshire, but no better beginning of the policy could be made than by acquiring Crawford Notch.

This remarkable mountain pass has many claims upon the people of New Hampshire. Historically, as a highway between the north and south, it has interesting associations. It is one of the most picturesque regions of the White Mountains, and thousands of people have passed each year by rail along its mountain sides or by carriage or motor car along the road that winds like a thread through the forest shades of the valley floor. The Notch is valuable largely through its forests. Strip the mountains of these and this beautiful pass would become a barren waste. The steep mountain sides along the Notch will not bear heavy cutting. It would rapidly be followed by destructive slides laying bare the rocks. The Notch is the upper valley of the Saco, which has its source just above the north gateway and tumbles swiftly down the sharp descent until it spreads out upon the Conway intervalles. Down the precipitous sides of the mountains that guard the Notch flow a thousand feeders of the river, having their sources in the springs maintained by the forests on the mountain side. Cut off these forests and remove the protecting soil and it is very evident what the result would be—alternations of flood and drought.

There is ample reason then why New Hampshire should preserve the Crawford Notch because of its value as one of the show places of the state and because of the protection that its forests afford to the streamflow of the Saco. The devastation of the Notch by extensive lumbering would entail a tremendous annual loss upon the state of New Hampshire in the diminished attractiveness of the mountains from the defacement of this noble piece of scenery. The people of the state might as well vote a permanent state tax from which they would receive no return as to allow the forests to be cut from Crawford Notch.

The immediate occasion for the present agitation which has been started by the Society for the Protection of New Hampshire Forests is due to the fact that the present owner of the Notch is about to put in lumbermen and begin extensive cutting which would ultimately largely denude the Notch. The Crawford Notch is not included in any incorporated town, but is in what is known as Hart's Location, a narrow strip reaching out from Grafton County. It is owned by one person and, as it is a somewhat extensive property measured vertically and consists entirely of rocks, scenery and forests, the only way in which the owner can realize upon it is by selling the timber. This he naturally wishes to do and will do. He can hardly do otherwise. Here there is a striking example of the absolute necessity of the state doing these things which it can do to the general advantage while the individual cannot protect himself except at the public expense. The state can realize an annual return from the property by preserving the forests and the scenery, and practicing conservative cutting.

There seem to be ample reasons for state action and, while New Hampshire is not a rich state, it is not burdened with debt and this proposal is for an investment to preserve a part of the most valuable asset the state has within its borders—its forests and its scenery. The state may feel a just civic pride in the ownership of the Notch. It may say with justice to the rest of the nation that in appealing for national forests in the White Mountains it asks not for alms but for co-operation; that it is doing its own share well and has earned the support it asks in other directions.

EDUCATION

Lehigh University's Useful Work

During the past two years a new departure has been initiated in forestry education by Lehigh University, which has attained pronounced success. This work was referred to in the opening address of the president of the association at the annual meeting of the American Forestry Association in January, and also in the resolutions of the association adopted at that meeting.

About two years ago, a friend of forestry in Pennsylvania, who has done much to advance the cause, proposed to Dr. Henry Sturgis Drinker, the president of Lehigh University, to establish a department of forestry at Lehigh. Dr. Drinker immediately took the matter up, and after obtaining the opinions of distinguished and competent experts in forestry education, reported that at the present time the

existing schools of forestry at Yale, Harvard, State College, and Mont Alto in Pennsylvania, were apparently sufficient in the sphere of influence likely to be reached by Lehigh University, for the training of the number of professional foresters now needed, but that a great work could be done by forwarding a movement in the institutions of higher education in America to spread and impress a knowledge of forestry, not only on the student bodies of the several institutions, but on the public who could be reached in the vicinity through lectures and through the public press. This idea was taken up, a sufficient endowment was provided for the purpose, and during the past two years a most valuable course of lectures has been given on forestry at Lehigh, to which the public has been cordially invited, and which has been largely attended and largely reported by the public press.

Among the lecturers who have taken part in these courses are: John Birkinbine, president of the Pennsylvania Forestry Association, Dr. J. T. Rothrock, secretary of the state forestry reservation commission of Pennsylvania, S. B. Elliott, member of the state forestry reservation commission of Pennsylvania, Irving C. Williams, deputy commissioner of forestry of Pennsylvania, F. W. Rane, state forester of Massachusetts, and the Hon. Curtis Guild, Jr., president of the American Forestry Association. It is expected that lectures will be given in this series during the remainder of the present collegiate year by Filibert Roth, professor of forestry in the University of Michigan, Professor B. E. Fernow, dean of the faculty of forestry of the University of Toronto, Samuel N. Spring, state forester of Connecticut, and George H. Maxwell, executive director, flood commission of Pittsburg, also executive director of the National Irrigation Association.

Apparently no better means could be devised to bring home to our people some knowledge of this great subject than for it to be spread by our institutions of higher learning, who can speak with authority. In addition to the course of lectures at Lehigh an arboretum is being developed in the University Park for the education of the public as well as of the student body, and a museum of cut woods, showing samples of timber, is being worked out.

Very cordial appreciation of this work at Lehigh University was manifested at the recent meeting of the association.

Field Work by Nebraska Forestry Students

An extensive field trip has just been completed by the advanced forestry students of the University of Nebraska. This trip is designed to supplement the practical experience the students have had in other forest regions as well as the regular instructional work at the university, and is usually taken by students who have had from one to three seasons of varied work in the woods. Northern Wisconsin and Michigan were chosen for the month's trip since the diversified stands of hardwoods, hemlock and pine give a remarkable opportunity for studying forest types, fires, reproduction, cruising, valuation surveys and a greater diversity of exploitation and utilization than is to be found in any other forest region.

The field work was under the charge of Mr. F. B. Moody, assistant state forester of Wisconsin, and Professors Phillips and Sponsler of the University of Nebraska. Valuable evening lectures were given by Mr. R. S. Kellogg, secretary of the Northern Hemlock and Hardwoods Manufacturers Association, on forest products. Several informal talks were given by Mr. Carl Hartley, an expert on forest tree diseases, who accompanied the party on its trip.

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NATIONAL FOREST WORK

The Report of the Forester for 1910

The annual report of the Forester to the Secretary of Agriculture is a valuable resumé of the work of the United States Forest Service for the year and becomes a most important document for reference. It is growing in size each year and that for the fiscal year ending June 30, 1910, is larger by nearly fifty per cent than its predecessors for two years. The total expenditures for the work of the service for the year were \$4,678,427.37. This expenditure was divided as follows:

Administration and protection of the national forests.	\$3,752,316.91
Permanent improvements, national forests	598,835.64
Co-operative and investigative work and making known results	327,274.82

The expenditure for permanent improvements was made from the special appropriation for that purpose of \$600,000.

Changes in national forest boundaries during the year involved additions of 463,517 acres and eliminations of 2,037,645 acres. The area of the national forests July 1, 1910, was 166,103,621 acres in the United States, 26,761,626 in Alaska, and 65,950 in Porto Rico, making a grand total of 192,931,197. As has already been stated in these pages, the eliminations will ultimately amount to about 6,250,000 acres and the additions to about 3,000,000 acres.

The matter of claims and settlements is discussed quite fully in the report and it is very clearly shown that everything is being done by the service to promote legitimate settlement and the best use of the lands in and about the forests. The sum expended for administration and protection of the forests amounted in 1910 to .01894 cents as against .01510 in 1909. For permanent improvements, .00310 cents in 1910 against .00309 in 1909. The per acre expenditures are computed on the basis of the gross area of all national forests under administration at the close of the year, since private holdings within the exterior boundaries of the forests do not appreciably lower the cost of administration and protection. An interesting passage in the report is that dealing with the new regulations for the development of hydro-electric power. The report compares the form of the old permit and the new. Under the old the government charged for the occupancy of its land by a power company an annual sum computed on the basis of the actual output of energy with a deduction for water used by the company from artificial storage supplies which the company may have created. Deductions were also allowed in proportion

to the part of the total drainage basin not contained within national forests, and for various other specified reasons. Determination of the amount to be collected, therefore, involved constant measurements, both of the actual output of power and of the water flow from storage reservoirs, where these had been constructed. This meant both much trouble to the government to find out what to charge and fertile grounds of dissatisfaction and dispute. Further, the old form of agreement did not seem to provide sufficient safe-guards against the speculative holding of sites without prompt development of the power.

The new rate will be based, primarily, on the value of the land occupied for power purposes, as measured by its capacity for the development of power, with a deduction for distance from market and for portions of the land to be occupied which do not belong to the government. A fixed rate of \$1 per net electrical horsepower per year is the full charge. This rate is equivalent to one sixty-sixth of a cent per kilowatt-hour, which is about one-thousandth of the rate at which power is generally supplied for lighting purposes and about one two-hundredths of the average charge for all purposes. It is therefore so light that it could under no circumstances constitute an obstacle to development. Compared with the fixed charges which represent the cost of construction of a power plant, the charge made by the government would not amount to more than one-half of one per cent of these charges.

In imposing this charge it is recognized, on the one hand, that there will be a non-productive period followed by a partially productive period before the company occupying the land will be in position to profit by the full power capacity of the site, and, on the other hand, that dilatoriness in pressing forward development may be encountered if collection of the charge does not begin until after the plant is in operation, for water rights may be acquired rather with a view to preventing them from falling into the hands of some one else than with a view to putting them to immediate use. Therefore, from the time the permit is granted, the permittee must pay the charge annually. But up to the tenth year, when complete development should have been secured, the rate is a reduced one, and amounts paid during the nonproductive period are credited against the rentals which will be due during the period of partial production. Hence permittees do not eventually pay for occupancy of the land during the period when the power must continue to run to waste, but they are compelled to make an-

nual payments, which preclude the tying up of power sites in order to restrict production and thereby maintain high rates to the consumer.

Fundamentally, the course of the forest service in handling water power questions rests on three principles: (1) That the government as owner of the land has the right to fix the conditions under which a private individual may take possession of it for private business use; (2) that as trustee for the public it is the duty of the government, on the one hand, not to permit the use of public property without securing a due return to the public, and on the other hand, that this return should not be obtained on terms which could in any way lessen the supply to the public of an important industrial commodity; and (3) that it is the duty of the government, in the public interest, to prevent the tying up of power either by speculators who initiated rights with a view of selling them out at a high price or by those who would prevent full development of the potential power supply in the interest of market control.

This policy in no way conflicts with or diminishes the power of the states to regulate corporations engaged in the supply of hydro-electric power. It is considered, for example, that any regulation of rates charged the consumer which may be necessary will naturally be undertaken by the states. Neither is any attempt made at federal regulation of the corporations engaged in the development of electrical power as corporations. The federal government takes cognizance of the matter simply because, as the owner of title to land held in trust for the people of the United States, it is in duty bound to promote the full development of the natural resources of the land, without directly or indirectly handing them over to private individuals for their exclusive use and benefit.

The report calls attention to the need of vesting in the Secretary of Agriculture power to grant permits irrevocable for a considerable term of years except for breach of the conditions of use fixed by the permit itself. This is necessary in order to insure the stability that will encourage capitalists to invest large sums in development enterprises.

The number of free special-use permits issued during the year was 2,986—practically the same as the year before. The number of such permits in effect at the close of the year was 6,989 as against 5,540 one year previously.

The forest force of supervisors, deputy supervisors, rangers, guards, forest assistants, field assistants, timber and mining experts, hunters and clerks, numbers 2,536. The policy of distributing the work of the service among the forest districts

has been continued and at present only 18 per cent of the entire enrollment (3,091) of the service are engaged in administrative, executive and clerical work in localities other than on the national forests. The number of rangers has been increased by 293 so that the average area in charge of each ranger is 104,307 acres instead of 125,065 acres. This is evidently too large a territory to look after adequately. The requirements for rangers have been made more exacting and the minimum salary has been increased to correspond with the higher quality of service expected. The minimum pay is now \$1,100 instead of \$900.

The present estimate of the total stand in the national forests-exclusive of Alaska is 530,000,000,000 feet.

As the reports of forest fires are made by seasons, this report covers only fire conditions for the calendar year of 1909. The forester calls attention to the great need of adequate protection and says that it will be brought about as rapidly as possible. It requires (1) the removal of the causes of fire; (2) a proper organization and equipment of the forests for protection; and (3) efficient patrol.

The use of oil as fuel by some of the railroads brought ideal results. The Chicago, Milwaukee and Puget Sound Railroad uses oil burning engines through the forests of the northwest. During the summer of 1910 reports show that not a single fire was started from the engines of that company. On all lines using sparking fuel repeated fires were started, in some cases twenty-five to thirty fires in a single day within a stretch of fifty miles. The forester urges the need of at least one regular patrol to every ten thousand acres in the heavily timbered forests during the dry periods.

The total cut of national forest timber was 379,616,000 feet cut under sale and 104,796,000 cut under free use. The sales of timber in 1910 amounted to \$1,400,922.69; in 1909, \$568,903.02. These figures show an average stumpage price for 1910 of \$2.44, as against \$1.98 in 1909. The object of national forest timber sales is by no means solely the gathering of a harvest which nature has planted and matures. The supply of virgin timber in the United States is the heritage of centuries and must soon give out unless a new investment is made. Silviculture is the making of such an investment. Most timber sales are planned with a view to securing by one and the same operation the ingathering of the ripened crop and the sowing of a new crop. The only cases in which this is not true are when the cutting is applied as a means of stimulating increased growth in established stands, with utilization at the same time of the surplus material removed, and when the

conditions are such that artificial reforestation will be resorted to in order to establish a satisfactory new stand. Taking care of an existing stand without provision for the growth of a new supply when all that is now growing is gone is not forestry but enlightened lumbering and no more. The forest service is not merely protecting the present stock of timber on the national forests in order to sell it off when opportunity arises; it is practicing forestry upon them. It is the policy of the government to put to use the timber which is mature and to protect carefully the trees worth leaving for future growth, to replace promptly by new growth timber which is cut and utilized, and to extend the forest by artificial sowing or seeding over the areas stripped of timber by previous fires. With the further development of forestry many stands will be clear cut and restocked by artificial seeding or planting. So far but little of this has been done except to supplement natural reproduction. The efforts of the forest service in artificial reproduction have been largely confined to the extension of forests on land on which the forest has been destroyed by fire.

The timber cut under free-use permits represented about 21.6 per cent of the total cut of the year, or 104,796,000 board feet, valued at \$176,166.51.

The problems of reforestation in the national forests involve the replacement of the forest by new growth after the removal of the timber to be cut and reforestation of land which has been cleared in the past by fires, lumbering and other agencies. The service maintains a number of nurseries, the principal ones of which have an annual productive capacity at present of 16,550,000 seedlings. Seeding and planting was done during the year on 106 of the national forests and a total of 9,745 acres was sown and planted. Thus far this work has been to a considerable extent experimental.

Experiments have also been carried on in thinning to determine the increased rate of growth and whether a better quality of timber is produced. The beginnings made in 1909 and the years before in reconnaissance studies on national forests were carried forward more extensively. These timber estimate studies are made for the purpose of ascertaining the resources of the forests and are used as a data for outlining a plan for their future management. Investigations of insect infestation and diseases of forest trees were carried on as in previous years in co-operation with the Bureau of Entomology and the Bureau of Plant Industry.

During the year the benefits of proper range control, the needs of national forest administration and the ultimate effect of this administration upon the range and live stock district were increasingly realized by stock men who used the forests.

Of the 146 national forests in the United States exclusive of Alaska, six afford no grazing for domestic animals. The remaining 140 forests were under grazing administration. The total number of animals grazed under permits showed a falling off of 2.75 per cent as compared with the previous year. This was due primarily to the decrease in the grazing area because of eliminations either made or contemplated.

An investigation has been begun to determine the character of all lands within the forests, the class of stock to which each natural grazing unit is best adapted, the natural periods of use for grazing purposes, the undergrazed, fully grazed, and overstocked ranges, the areas upon which poisonous plants abound, and the areas infested with range-destroying rodents. Such a reconnaissance of a forest, when completed, will furnish a reliable basis for the preparation of a grazing working plan, which will be used as a guide in the allotment of grazing privileges, the determination of improved methods of range control, and the improvement of the ranges. The report of the condition of the animals in the Wichita and Grand Canyon national game preserves, both of which are located within national forests, is most favorable, both as regards numbers and increase. The buffalo herd on the Wichita preserve is in excellent condition.

The construction work of the year comprised 2,225 miles of trails, 320 miles of roads, 1,888 miles of telephone lines, 65 bridges, 563 miles of fences, 181 miles of fire lines, 464 cabins and barns and 51 corrals. This was an increase of 25 per cent over the previous year in the mileage of communication lines and protection constructed, and a reduction in the number of buildings of 20 per cent and in miles of fences of 28 per cent.

The appropriation for permanent improvement on the national forests was \$600,000. For the fiscal year 1911, however, the amount available for this work is only \$275,000. On this point the forester says: "While it is impossible to equip the forests offhand, by the expenditure of a great sum, with a thoroughly well planned and effective equipment of the various kinds of permanent improvements needed, a much larger amount than is now available could be used to advantage in carrying out plans already matured for such equipment." He then sets forth the advantage of systematic development according to a well conceived plan such as has been made for each forest. Of this plan he says:

"These plans contemplate what may be called the primary system of improvements. Subsequently these improvements will be required to be supplemented by the development of a secondary system to provide for intensive use of all parts of

the forests. The development of the secondary system will take place naturally as the development of each locality in population and wealth calls for it, and in some forests it will not be called for at all until after it has reached an advanced stage elsewhere. The primary system, however, is called for on all forests just as rapidly as it can be supplied. The plans now prepared for the individual forests call for the building of over 30,000 miles of trails and nearly 7,000 miles of roads, at an estimated cost of over \$3,000,000; of over 16,000 miles of telephone lines, at an estimated cost of nearly \$1,000,000; of over 5,000 miles of fences, at an estimated cost of nearly \$600,000; and of other permanent improvements, including rangers' quarters, of over \$1,000,000. With the further amounts needed for fire lines, bridges, watch towers, tool stations, and other purposes, the cost of the present estimated needs of the forests reaches a total of over \$7,800,000.

A Supervisors' Meeting

A meeting of the national forest supervisors and forest assistants of District 5 of the Forest Service, which includes practically the state of California, was held in San Francisco on December 13 to 16. Papers prepared by members of the District Forester's office opened to animated discussion by the supervisors the most important phases of national forest administration and management in the district.

The first paper, "What Does the Forest Service Mean?" was presented by the district forester, F. E. Olmsted. After pointing out that the forest officers of the district are guardians and business managers for 29 million acres of public lands, whose resources are worth over \$200,000,000, with other hundreds of millions of dollars worth of property directly or indirectly dependent upon their wise conservation, Mr. Olmsted called attention to the fact that in the absence of the national forest policy, these lands would now be mainly in individual ownership; the great bulk of the timber locked up for investment or speculation by large private owners, and when in process of logging, being cut destructively for the sake of the highest immediate money returns; grazing lands also concentrated and managed with reference solely to the profit of a few individuals, and other public lands, including those of peculiar value for the development of water power, taken up in the same way; in short, everywhere a tendency to concentrate wealth in private hands, accompanied by exploitation of

each resource for a single purpose, without consideration of possible adverse effects upon other individuals or the public. As against this method of dealing with natural resources, there had developed during the last fifteen years, under the leadership of one man, a conception of far-sighted, comprehensive, orderly development of national forest resources for the benefit of the public, and by the public. This, however, was merely the foundation. It is now the task of the forest service to raise the superstructure, which must be done largely through the joint efforts of the men who are handling, on the various forests, the individual problems.

Assistant District Forester T. D. Woodbury, in a paper entitled, "Silviculture's Future Work," laid emphasis on the fact that it has hitherto been impossible to bring the forests to a high state of productiveness through the application of forestry, which is brought about by cutting, because a restricted market has made it necessary to concede much to the purchaser, in order to make any sales at all. It was pointed out that at present the most important matter is careful study of the problems involved in marking the trees for cutting, but that with a broadened market there will come improved opportunities for the practice of forestry, which can be taken proper advantage of only if full and precise knowledge of stands, yields, and silvical properties has been accumulated. There is also the forest regeneration problem of the district, with its 2,000,000 acres of denuded forest land, of which about 1,400,000 acres will reforest itself from seed trees, while about 600,000 acres will have to be artificially reforested.

Papers on "Silvics of the Future," by Louis Margolin, forest examiner, and "Forest Reconnaissance," by Swift Berry, of the district office, dealt further with the silvicultural work of the district.

Dr. E. P. Meinecke, consulting pathologist of the Bureau of Plant Industry, pointed out the importance of combatting tree diseases through provision for forest hygiene. This was further considered by forest ranger John Miller, in a paper on "Forest Insects and Methods of Fighting Them."

Other papers, presented by O. C. Merrill, chief engineer of the forest service, W. B. Huber, Associate District Forester Coert du Bois, and Assistant District Forester John H. Hatton, discussed problems relating to water power, forest fire protection, and national forest grazing, while problems relating to forest products were presented in papers by C. Stowell Smith, Carl A. Kupfer, and A. K. Armstrong.

As sunbeams stream through
liberal space
And nothing jostle or dis-
place,
So waved the pine tree through
our thought
And fanned the breeze it
never brought.



WHITE PINE IN NEW HAMPSHIRE

THESE WOODS GROWN FROM SEED HAVE BEEN
UNDER EXCELLENT MANAGEMENT FOR
THREE GENERATIONS



WHITE PINE IN NEW HAMPSHIRE

WHAT AN OCCASIONAL SEED TREE WILL
DO IN THIS REGION



WHITE PINE IN NEW HAMPSHIRE

FOREST IN KEENE FROM WHICH
\$48 PER ACRE HAS BEEN
THINNED LEAVING \$64 PER
ACRE FOR ANOTHER CROP

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THE PEOPLE'S POSSESSIONS IN THE APPALACHIAN FORESTS

By THOMAS NELSON PAGE

(Address before the American Forestry Association at the annual dinner, Washington, January 13, 1911.)

WHEN John Evelyn, in view of the impending disaster of the complete destruction of forests in England, was commissioned by the Royal Society of Great Britain to address them on the subject of forestry, he delivered a book, and possibly, if one should measure up to the importance of the subject of the preservation of the forests of this country, especially of this older, eastern slope, he would endeavor to follow the example of that illustrious predecessor and undertake likewise to give a complete essay on the subject. If he could prepare such a work as John Evelyn's "Silva," then, indeed, it might be worth while to hazard even taxing the patience of the public, for it is one of the quaintest works in the English language, and if one but have the faculty of skipping with propriety, he will find it one of the most thoughtful, charming and instructive works that the notable literature of our fathers can boast of.

In view of the fact that our new interest in the preservation of our forests is due to the sudden forcing on our attention of the extraordinary disappearance of our forests with the disastrous consequences that are following it, it cannot but be interesting to reflect that this great contribution to our literature grew out of the sudden realization on the part of the leaders of the English people that their great forests, once the pride of their country, had been depleted far beyond the danger point, and that the public mind needed awakening to the peril that unless the waste were stopped England would soon find herself without the timber requisite to maintain the wooden walls on which her salvation depended.

Here, after two centuries and a half, we find ourselves in this land which was once wholly covered with forests confronted by the same impending disaster, a disaster from which in turn the peoples of Asia and of Europe have suffered injury beyond the power alike of calculation and of repair and, as in John Evelyn's day, every far sighted man is called on to take service in the cause of education in this vital matter. The most obvious argument which one might urge is of course that of material return; but there are other returns not less important than the one which may be measured by the lumber standard. The influence of the forest and the grove on the human mind, and thus on human progress, is one which may not be directly measured, for it is immeasurable.

A great physician (the late Dr. Hunter McGuire of Virginia), stated that he once performed an operation which restored sight to a child who had been born blind, and that soon afterward he asked the child what was the most beautiful thing in the world, and the instant answer was "a tree."

It must have been in the realization of this truth of nature that the Holy Record begins with the placing of a tree in the midst of the garden which God planted, and ends with the same conception of beauty—the tree of life whose leaves are for the healing of the nation.

The discussion of the merely material advantages to be reaped from carrying out the broad and high-minded plans of the Forestry Association for the conservation of the forests of the Appalachian range through means of great government parks will be left to those more familiar than the writer with the statistics of the subject; as will also the discussion of the technical, legal and constitutional questions which appear to be somewhat involved in the plan be left to those whose responsibility is to direct the destinies of this country by constitutional methods for the benefit of the people of the land. The writer proposes to present his plea for the preservation of the people's possessions in the Appalachian forests on grounds which appeal to him in the hope that if sufficient interest can be aroused among the people of this great country, this important subject may be dealt with in such a manner as to preserve this priceless possession of the people to them and their posterity forever, without in any way impairing the even more priceless possession of procedure according to unquestioned constitutional methods.

It is true that most people are touched through appeals to their material interests; but it is even more true that a great number may be touched through an appeal to their reason, and that yet higher motive power, their sentiment. The argument of loss through the waste of billions of feet of lumber may appeal only to the limited class of those who might profit by a more conservative and wise method of dealing with these resources. But the argument of saving from destruction at the hands of greed alike "the glory of the forest" and the fertility—indeed, the existence of the soil of not only the contiguous territory, but of the whole surrounding region, will appeal to all lovers of their country. The only thing needed is to educate them—to bring clearly to their intelligent apprehension the fact that the present system of forest destruction is one that, reversing the poet's dream of the statesman's work, "To scatter plenty o'er a smiling land," is as certain as any other law of nature, to scatter ruin and turn the fertile places into a desert. The history of all countries, written in the unmistakable records of perpetual erosion shows this, where tracts of endless desert stretch in regions once as fertile as a garden and where the silence of the wilderness has succeeded to the life of a teeming population.

The future of forest conservation in this country depends as does the future of constitutional government of the country on the education of the people. No branch of education has advanced with more rapid steps of late than has that which relates to forestry, and whatever may happen in the future the foundation of this branch of our national development was laid by one who was for several years a high executive officer of the American Forestry Association, who first brought the subject as one of national importance to the attention of the American people. No man in the world comprehends more fully and appreciates more highly the debt which this country now owes and which coming generations will continue to owe to the zeal and far-sightedness of the man who is the true father of conservation in this country. Forestry is his passion and the ennobling influence of this noble pursuit was never more plainly manifested than in the enlargement of his mind to take in

and comprehend the extended scope of the idea of conservation. "Nihil est homine libero dignius," says Cicero, whom Evelyn quotes with delight, adding this from the poet of the Georgics, "*Silvae sunt consule dignae*"—"No, not the majesty of a consul." If at one time or another—if in this matter or that matter, he has been over-zealous—even wrong-headed, if his opponents please—this in no respect affects the basic fact that, owing to his zeal and his passion and his patriotism, has come into being the sudden realization on the part of the American people that they have a great possession which was steadily passing away forever, and that they have awakened to the vital importance of so using it, as to preserve it for the future benefit of posterity.

It is well for the American people that the alarm bell has been rung and that this trumpet note has been sounded haply in time. For the exigency is not less great in America today than it was in England when Charles II, amid the dissipations of his court, was suddenly awakened to the fact that the forests of England were being destroyed beyond the hope of resurrection, and founded the Royal Society of Great Britain with a view to establishing a great scientific society which should scientifically promote the reforestation of England.

When the curtain which had through the ages veiled this western continent from the peoples of Europe was drawn aside and the vision of America first dawned on their astonished view, nothing impressed them so much as the unimagined wonders of the products of this virgin land. The reports of the first voyagers and of their successors not only for some years, but for some generations, were so wonderful that they were considered to excel the narratives of Mandeville, Marco Polo, and even to eclipse those of the redoubtable Baron Munchausen. Gold, of course, was believed to be here in such quantities that even the commonest vessels of the barbarous inhabitants were believed to be formed of this precious metal. The sea shore was believed to be pebbled with precious stones, the rivers were reported to be so filled with fish that men might walk over dry shod upon them. Even now the dream of Eldorado remains in men's minds and if the imagined city of the Incas has not been found, in desert regions long afterward discovered, gold has been found in quantities greater than even fancy imagined. As they penetrated further to the westward they found other products in equal magnitude. Wild fowl that filled the rivers, the forests and the prairies in quantities which surpassed the capacity of the mind to calculate. Wild game, not only such as kings and nobles were entitled to hunt in the old country; but of new species—the buffalo, the elk, and the antelope—filled the forests and covered the prairie. The quantity was beyond the previous reach of the imagination of man, and even today it staggers the credulity of a generation whose fathers saw them with their own eyes.

But of all the wonders of America, nothing amazed Europe more than the vastness of the forests which covered the continent. All records and reports are filled with the proof of this amazing growth of forests from sea to sea, and from the icy north to the tropical regions of Mexico. But a few generations ago, at most in the time of our grandfathers, this well-nigh fabulous condition as to game still remained. The buffalo, the elk, the antelope, though they had retired before the advance of the destroyer, man, still covered the prairies and filled the mountains of the west, in almost infinite numbers. The wild fowl in their flight, at times darkened the sun and quite blackened the waters and filled the forests. Today there are of the most noted species scarcely left enough to stock the zoological gardens, while other species both of animals and fowl are rapidly disappearing and in a few generations will probably be not less scarce than the buffalo and the antelope are today.

The same fate which has befallen the denizens of the forest at the hand of man, is now proceeding and with equal rapidity against the forest itself. With

the axe and the yet deadlier weapon, fire, the forests of the country are being destroyed in a prolonged fury of sheer wastefulness, the wastefulness which is one of the marks of that madness with which the gods visit alike men and nations whom they wish to destroy. Much of this destruction is due to sheer ignorance and heedlessness; but the end is the same and unless the people at large can be awakened to a full realization of the enormous folly of such destruction, the time must come within a few generations when the forests of this country will have disappeared as completely as the forests of Western Europe and of Eastern Asia.

The three great enemies of forests are storms and fire and man. There are others but these are the most destructive and of the three, man is easily the most deadly. Attention may be called to the fact that, though one of the greatest enemies in the world to forests is the storm which is always destructive and often with its besom of destruction sweeps down everything in its pathway, yet this subject of forest conservation appear to have survived in full vigor and health one of the most threatening and violent commotions which has happened in our day, and all may rejoice that, though the lightning has been continually playing around and the thunder has sometimes been almost deafening; though, indeed, from time to time the forked bolts are still flashing and the rolling thunder still reverberating, they are growing further and further away; the chief violence of the hurricane appears to have spent itself; the atmosphere appears to be clearing and the subject of forest conservation still survives apparently unimpaired. It is a good augury that possibly there are a good many who like myself steadfastly endeavored amid the greatest commotion to maintain an equable frame of mind and to pursue that middle course which in most things is safest, who have never felt it necessary to accept the extreme view on either side, but have been glad to recognize the admirable and indeed invaluable work which has been accomplished by those who have so earnestly sought to preserve for the people—the people of this age and their posterity alike—their priceless possession which without their zealous advocacy would have been lost forever.

One of the chief dangers of this extreme contention was the apparent transference of all the thought and energy of the country from the general subject of conservation to the particular and distant subject involved in the controversy, and the advocates of conservation may felicitate themselves that there is some interest still left in the conservation of resources this side of Alaska and even of the Rocky Mountains.

In my early life the mountains that I knew were those whose azure tops appeared on clear autumn evenings along the horizon's rim to the northwestward—the mountains which Spottswood with his knights of the Horse-Shoe had crossed to plant beyond them the flag and establish the civilization of the Anglo-Saxon—the mountains amid which George Washington had spent his useful and sobering youth as a young surveyor in communion with Nature and God, and which he had penetrated at that age which seems so great to boys—the age of bare majority—to carry the message of the Anglo-Saxon to the Frank in his commanding fort at the junction of the Allegheny and the Monongahela. An old map of North America used to hang on the walls of the sitting room in my old home in Virginia, nestled amid primeval oaks and hickories beneath which Tottapottamoy children must have played. It contained meagre details only as far west as a short distance beyond the Mississippi River. All the rest was blank, save that there were large lettered names of territories with vague boundaries in the wide expanse to the westward and beyond was a mountain range sawed across the west, marked "Rocky Mountains," with the fringe of the Pacific Coast beyond them. To the northwestward beyond a great blank, vague space, marked "British Colum-

bia," was an even more uncertainly defined space marked Alaska, forever fixed in infinite distance by "The wolf's long howl on bon Alaska's shore." Youth knew, therefore, something of geography even in our boyhood—knew, that is, where the Rocky Mountains were, though they were far beyond the region whence at Christmas time came the buffalo tongues and prairie chicken from cousins in far Missouri. The Rocky Mountains were, indeed, as far as the Mountains in the Moon are to us now, and the Allegheny Mountains were mountains of our youth and next to them were the White Mountains and the Green Mountains to the northward, where the name of Washington had been given as was fitting the highest peak that overlooked the Presidential mountain range of New England, and the waters of the Atlantic.

Possibly, it is for this reason that the writer still retains an especial interest in these eastern mountain regions. There are, indeed, other reasons for his interest, only one of which he feels need be mentioned now, that is, that from a more intimate personal knowledge of them since he grew to man's estate and long before this doctrine of conservation became such a national thought he has felt that they belonged in a peculiar way to the people of this country and that if properly cared for, preserved and utilized they would furnish a more invaluable asset to this country than even the average member of the Forestry Association dreams of.

In the discussion of this subject it is not necessary and the writer does not wish to express an opinion upon that phase of it which would lead him into the technical, legal, or political questions relating to its occupation and legal ownership. If he has apprehended aright the discussion which has taken place we are in some danger of abandoning the proper and more essential ground on which to base our claim for the preservation of the treasures in this region for a more narrow, technical, and debatable one—that of the extension of governmental powers based on the government's right to control of navigable streams. I feel that the work of this great forestry movement is larger and less factional and less political and more national than can be measured by any appeal to possibly questionable governmental powers. Its strength, its breadth, its present and future vigor and its perpetuation are all dependent on its being so conducted that it shall avoid all questions of doubtful expediency and commend itself by its wisdom and breadth to the great body of American people and thereby become associated with their pride and their patriotism and become the ward of their national care.

With regard to the forests of the White Mountains, the writer thinks that the able and shrewd representatives of New England may be counted on to lend their aid to what is so manifestly to the advantage of that section. But as one who, as a summer resident on that coast, participates in the benefits alike to body and soul of that charming summer air, he ventures to urge the preservation of the forests as even on the lowest ground of material return the plain part of wisdom. Those forests are worth more to New England every year than every foot of lumber in them would be worth sawed and dressed. They are a perennial source of income to the whole New England coast. Poets have hymned their beauty until they have entered into the heart and mind of the people and become enshrined in their literature, and however one may question the vaunted primacy of New England in other matters, he must acknowledge that in the autumnal glory of her mountain forests she stands unrivaled. If they shall be destroyed New England will suffer a loss which can never be made good. The White Mountains will in a few generations become the black mountains, and the most famous summer resorts of New England will in time be deserted by the teeming multitudes who now find recreation and health amid their forest clad ranges.

Leaving this branch of the subject to others the writer may take up the question relating to the Southern Appalachian range. When one speaks of

interest in tracts of forest, and in ore-bearing regions nowadays it behooves him to make his position clear. His interest in the Southern Appalachian range is a patriotic and not a pecuniary one and the same may be said of his interest in the White Mountains. It is solely that they may be preserved for the nation. And first it is his belief that they, like the White Mountains of New England, are in the future to be the great health resort and the great pleasure ground—in its higher sense—of all the people of the eastern part of this great country. The parts that have been opened have already become a great health resort. Nor is this the least remunerative way of using mountains. The Land of the Sky in North Carolina has paid the country more than if every stick of timber in it had been sawed and shipped as lumber. So it will be of other portions of the range. Modern science has discovered that a certain elevation neither too high nor too low is best adapted for the health of the human race. Near enough to the sea to feel the influence of that ocean which "creates a climate with its breath," and yet far enough away to have the rawness and the dampness strained through its fine-spun tennise of forest, high above the influence of malaria; contributing with its beauty and its charm to the welfare alike of body, of mind, and of spirit, this region seems as if placed by God for the cure and abiding health of the race that inhabits this country.

In considering this all important matter of the conservation of our national resources of forest in this region, the richest opportunity offered to the advocates of conservation—richer than the preservation of all the forests that clothe the Appalachians from one end to the other is one that has been little considered. No delicate questions of constitutional construction arise touching it. At a glance it will be seen to be the plain duty of every one of whatever view as to national powers to aid in the movement. It is the educating and uplifting of the mountaineers, who inhabit this region. Like the Swiss mountaineers they are the greatest lovers of their homes in all the world. Without their co-operation the whole power of the United States can not save these forests. With their aid the thing will be done beyond a question. The writer declares his belief then that not only the best way, but the only way, to preserve the forests of the Appalachians is to avail ourselves of this richer opportunity and educate the strange and sterling people who dwell among the mountains and constitute their population. In this great region of the Appalachians dwells a race which needs only to have the mountain regions fully opened up to renew one of the most vital strains in our national life. Some three million souls inhabit the Appalachian range and its intervening valleys extending from the Pennsylvania border almost to the Gulf of Mexico. They are absolutely of Anglo-Saxon blood, whilst in other portions of the country, even in a portion like Massachusetts in the very heart of New England, which was once as absolutely Anglo-Saxon as is now this region of which I speak, foreign immigration has so changed the complexion of the population that 80 odd per cent are now foreign born or the offspring of foreign-born parents. In the Appalachian range the foreign-born population is so small as to be absolutely negligible, in some of the states it being less than one per cent.

It has been customary to apply to this mountain population such terms as "poor white," and "mountain cracker." Heaven knows they are in the main white enough and poor enough, but if the designation is intended to convey a term of reproach it is wholly misplaced. These people are the mountaineers of America—pure bred English, Scotch and Scotch-Irish stock. They have the names, they have the physiognomy, they have the characteristics, they have the vices, to some extent only, and they have the virtues and more than the virtues of the rest of the body of the American people. *Montani semper liberi.*

They are the guardians of liberty in this western world as they have ever been in the Old World. They are the custodians of the old speech and the old racial traits. The whole military force of the country would hardly suffice to turn their mountain region into a preserve against their will; but with their aid it would not require a corporal's guard. It is of the utmost importance then, that in this movement their interest and their co-operation be enlisted. And the best way to do this is to enlighten them, to prove to them that the movement will be for their good—in other words to educate them.

One of the most promising signs of the times is that our people as they make money are beginning to return to the soil. If our life should be confined to urban life this country would scarcely survive two generations, or at most a half dozen. The civilizations of France, of England, and of Germany, like indeed that of Rome, were all preserved from going to absolute ruin by the fact that their upper class who owned the land, after dissipating in the cities, returned to their rural estates for recreation. The tendency of the time has been absolutely in the direction of commerce, and if we have reaped the fruits of it that are good, so we have also reaped those that are evil. There was never a country in the world in which so large a portion of its wealth and of its thought and activity were applied to commerce and trade as in America. And we should all turn traders and go to bargaining and chaffering with each other till we had lost the principles on which all moral and physical advance are founded, if it were not for the country life. It is the panacea that Nature has appointed for the ills of violating her laws in the unwholesome atmosphere of city life. It would, therefore, appear to be the part of wisdom for every man in the nation to do what he can to uplift country life.

Owing to the physical conditions of this mountain region they have been secluded and sequestered from the pathway of advance, shut within their mountain walls they have been cut off from all or nearly all the advantages of modern progress.

A century or more ago they rendered an inestimable service to this country in that they manned and held against the Indians and the French the outer bulwark of American rule on this continent. They furnished the pioneers who crossed over and seized the Mississippi Valley. Again a half century ago they rendered to this country what I believe most of you here will esteem an invaluable service. Without them this Union would have been divided as surely as I stand addressing you tonight. Non-slave holding, participating little in the advantages of citizenship in the several states and therefore caring less for the divisions of state lines than for nationality and racial solidarity, knowing little of history save that which their grandsires had handed down to them, with the rifles with which they fought at King's Mountain and on the Kanawaha, they espoused by a great majority the cause of the Union. They furnished over 180,000 men to the Union armies, and they were not bounty jumpers or conscripts. But more than this they furnished to the Union cause a great friendly territory staunch for the Union through its breadth and length, extending for hundreds of miles down through the south and cutting the Confederate south in two. But for them Maryland and Kentucky would have gone out of the Union with a rush and Tennessee and Virginia would have been solid from east to west. You will perhaps get some estimate of what they merit at the hands of the Union if you but recall that in their territory Rosecrans, one of McClellan's lieutenants, was able to withstand him who was possibly the greatest captain of the English speaking race. When the seat of war was shifted from the mountains of West Virginia to the low lands of eastern Virginia, Lee was able to sweep McClellan from the gates of Richmond. But for them Missionary Ridge and Chattanooga would never have given Grant his laurels; but for them Sherman could never have marched

across Georgia to find the south empty of men; but for them the cause of secession would have inevitably succeeded.

I do not wish any one to misunderstand my personal position on this subject. In every fiber of my being—body and soul—I was with Virginia and the Confederate South. But as my people were Union men before the war, so they became Union men when the war closed, and however I may hold in my inmost heart the sacred memories of the unhappy and glorious past, I know now what the south is to this Union and I know how to honor those who were gallant foes even then.

I therefore make no apology for advocating before you the claims of this great population. As they saved the Union in times past, so in face of the rising tide of foreign immigration I feel that they may be destined to save it again. And it is one of the chief causes of my interest in this discussion tonight that I am wondering what effect this movement in the direction of securing a national forest in the Appalachian mountains will have on this population. If it will benefit them, if it will carry to them the light of knowledge, if it will open that region for the diffusion of the better part of modern science and modern knowledge, then I shall be heart and soul for it, and I believe that it will tend to do so. What is needed is that the rest of the world shall know that this population is among her Appalachian mountains; that they shall know what a virile strain courses in their veins; that they shall know that all that is needed is that the light shall be carried to them. They are beginning to awaken themselves to the knowledge that they are in darkness; they are beginning to see the glimmer of the light afar off and are groping their way towards it, asking that it may be brought nearer to them.

It has often been a cause of wonder to me that with philanthropy pouring out its lavish millions for the education and betterment of other races and other sections, so little of it should have gone to this race and region which saved the Union. All that they need is light and they may become themselves the torch-bearers of the future civilization.

I have not had time to go fully into the history of these mountains and these mountaineers, but I will tell you a few men who have come from there and by them you may judge their possibilities. Andrew Jackson came from there; Stonewall Jackson came from there; Abraham Lincoln was the son of one who came from there.

Do you think that the strain which produced these men has died out in the past generation? If so, you are vastly mistaken. No more virile strain of men and women exists in any quarter of the world than today inhabits the Appalachian range, and no one which promises more for the future welfare of this country. One of the most distinguished citizens of New York—a man of national reputation as an orator and a lawyer—was a mountain boy from the eastern corner of Tennessee, and what is more he was one of fifteen sons. His father never learned to write until after he was married and his mother never learned to write, but, mark me, this illiteracy did not necessarily mean ignorance. It was only that they had not had the opportunity. That father was a lieutenant in the federal army during the war and afterwards he reared fifteen sons in the fastnesses of the Appalachian range.

Now, sirs, talk about conservation, here is something worth conserving. Conserve the American strain in the Appalachian range by bearing to them the light of knowledge and giving them the advantages of education and training and you will have the basis of the greatest government park that this or any country has ever known.

Few schools or colleges of any importance exist among them. The states give them their share of the taxes levied for common school education, but the southern states still have a great illiterate population and are still unable

to meet with any adequacy their needs. Here and there private philanthropy and devotion has established some admirable schools, such, for example, as Miss Berry's school in Georgia; Miss Pettitt's school in the mountains of Kentucky; and Archdeacon Neve's school in the ragged mountains of Virginia. And there is a college or two, the most noted of which is Berea College in the mountains of eastern Kentucky. All of these are doing great work, but what are they among so many. They are but lights on the mountain to show the wanderer that human sympathy still exists and to encourage the lost not to despair. The writer feels that he could not render the cause of forest conservation a greater benefit than to call to public attention the fact that in this great forest clad region which so clearly demands preservation at this time is a population kindred to the best element of our people, constituting a great reservoir of conservation of those traits of the Anglo-Saxon which made this country the home of liberty and to which we may hereafter have to turn for the salvation of the Union as the Union turned to it in the fighting sixties.

In those mountain regions, when the fire in the cabin has been extinguished, they often have to send to a neighbor across the mountain to borrow fire. All they ask of us now is "Lend us fire." Should we not do so? Let us apply ourselves and our powers along this line of conservation. If we do, we may be very sure that the time will come when they will return into our bosom a hundred fold for all the gifts that we now bestow upon them.

It is interesting to observe in the literature of the ages the part that trees represent in the history of the race. In that wonderful record in Genesis, God's first creation was the heaven and the earth. Light from the spirit of God was the primal act. In the first day and in the second He created the firmament and divided the waters from the waters, and in the third day he created the dry land and the sea and the grass and the tree before he created man, thus before He created the inhabitants of the sea and of the earth He created the tree. And when He had created man in His own image and had given him dominion "over every living thing that moveth upon the earth," he said to him, "Behold, I have given you every herb bearing seed upon the face of all the earth and every tree in the earth which is the fruit of a tree yielding seed, to you it shall be for meat." To the beast of the earth and the fowl of the air and the thing that creepeth upon the earth He gave the green herb for meat; but He gave to man the tree for meat.

In the other and briefer account of the creation it is said that the Lord God planted a garden and there He put man whom He had formed. And out of the ground made the Lord God to grow every tree that is pleasant to the sight, and good for food, the tree of Life also in the midst of the garden and the tree of knowledge of good and evil. Thus the beauty of the tree was placed even before its usefulness.

Now from this earliest record on down you will find that the tree is an object of peculiar reverence to the poet and the seer, and are they not the leaders of the race?

There are those who would maintain that our aboriginal ancestors made their homes not only among but in the trees—were, to use the scientific phrase, "arboreal" in their habits. It is not necessary to enter on this discussion; it may be passed with the simple recall of the old woman's speech to the young evolutionist, that "if he preferred to think his ancestors were the same with those in the 'Zoo,' well and good; but she preferred to think hers were in the garden of Eden."

So all the way down history sacred and profane we find the tree mentioned with respect and with reverence; for even then without doubt in those regions inhabited by the older races the disappearance of the forests had become a matter of public concern.

The Greeks with their high poetic sense peopled the forests and groves and even separate trees with a supernatural and half-supernatural population of nymphs and satyrs and gods, and born of their conception have come to us the most beautiful and entrancing poetry of myth and fable that have enriched human literature.

The Roman adapted but somewhat coarsened the poetical conceptions of the Greeks touching the relation of forest and grove to the spiritual side of man, and in accordance with their more practical genius turned it to practical effect. It was in a grove that Numa Pompilius, the first of her thoughtful kings, was said to have met his Egeria and the "Bosca Sacra" is still pointed out today to the credulous.

Among our own ancestors the forest was held in equal awe, and the grove in equal reverence. The poetical conceptions of the Greeks and the Romans, however, were changed to suit their heavier and duller intelligence. Thor and Woden, and the thunderous hierarchy of Scandinavia supplanted in their imaginations the more graceful and ethereal conceptions of the south; but the priests of their religion celebrated their awful rites under the shade of the oaks which clad the hills of the north.

If it should appear that this discussion of the forest is too fanciful to be of practical service in a movement in which the more practical and material use is the chief motive, it may be answered that after all the poetical is but a further and higher development of the practical and that it is a more inspiring power in that while the practical relates only to the lower motives of the individual, that which touches the sentiment has a more far reaching and unselfish result. If sentiment is to be discarded in the name of the practical, let every man get all he can at no matter what sacrifice of others, but even patriotism is founded on a sentiment which is high above the groveling personal demands of physical life. It must be through a sentiment higher than that of the self-seeker who destroys without remorse for his personal service the most beautiful things in creation that the blessings of liberty and the contentment of peace shall be attained. It must be through sentiment, the sentiment of generosity, of philanthropy and of patriotism, that those who have secured the advantages of education will extend them to others less favored. It must be through sentiment that man's mind shall be extended to take in the great conception of his duty to promote the welfare of his fellow man and uplifted to take in the yet higher conception of his duty to the Supreme Being who has clothed the mountains with the majesty and the hills with the glory of the forest.

As already stated, when Charles II founded the Royal Society of Great Britain, one of his motives was to establish a great scientific society which should scientifically promote the reforestation of England, for the disappearance of its oak forests had already become a public menace and it was at the instance of this society that John Evelyn wrote his great essay on forestry. In this work he alludes to the respect with which this subject is discussed by the great classical writers, and he deplores the indifference with which the English race regarded it. "Men seldom plant trees," he says in his preface, "till they begin to be wise; that is, till they grow old and find by experience the prudence and the necessity of it." And he recalls how "When Ulysses, after a ten year's absence, was returned from Troy, and coming home found his aged father in the field planting trees, he asked him why, being now so far advanced in years, he would put himself to the fatigue and labor of planting that which he was never likely to enjoy the fruits of, the good old man (taking him for a stranger) gently replied, 'I plant, against my son Ulysses coming home.'"

I think it may be said of nations as John Evelyn said it of men, that they rarely plant until they begin to be wise.

The great land of China with its teeming population is so denuded of forests that it is said that in many regions every stray weed and spray of grass is carefully collected and husbanded for purposes of fuel, and that men trundle hand barrows of coal for hundreds of miles to secure the fuel necessary to preserve life. Unless we shall awaken duly to the need of preserving our forests the time may come when this land shall be as China is today. There was a day when China had her forests, and though it may appear to us of a new country very long ago, a thousand years in China amounts to less than a century in the west. It is said that this danger of the disappearance of her forests became apparent to the rulers of China over 1,200 years ago, and that they set themselves to do what as has already been stated the king of England did after his restoration, to awaken the interest of the people in this vital national subject. A work on forestry was prepared by their direction which was so extensive that it is said to have contained over 50,000,000 of words, that is twice as much, possibly, as the most voluminous encyclopedia. It is said that three copies of this work were made and that the only one which survived was destroyed by the soldiers of the relief column of the allied forces which occupied the Chinese capital at the time of the Boxer rebellion.

One cannot go over Europe without being made aware of the devastating effect of indifference to the preservation of forests. For example: one could hardly ever forget the impression made in traveling over the desolate and treeless waste in Spain that lies south of the Pyrenees. Through the improvidence and folly of former governments this region that was once reckoned the most fertile within the sweep of the Roman dominion has become, if not a desert, something that looks very near akin thereto. The very song birds have flown from a region where not a tree or shrub is left to protect them and furnish the choir for their heavenly music. All through southern Europe the proof meets the eye that man has been forced with infinite pains, with a repentance as bitter as that of Esau, to make atonement for the carelessness with which he sold his birthright, for throughout this country in regions which must once have been covered with forests and which, owing to their denuding had the soil washed away, we see how infinite must have been the labor that was required to reterrace and reforest. We may all rejoice that the attention of the American people has been formally directed to this great source of national loss before it is too late.

It must often have struck every observant man not only how negligent the average American man is in the matter of preserving trees but how absolutely inimical he is thereto as in other departments of life. I think this state of mind is the result of natural causes and owing to that which at its best we term conservatism continues after the causes have passed away. England was once fully forested and then as its population increased the forests fell before them and tillage took its place; then came the Norman conquest, and in England, as in other countries, the conquerors and rulers, with a fine disregard for everything except their own wills, established forests not for the benefit of their people but for their own amusement, turning the cultivated lands that had been conquered from the wilderness back into wilderness and forest for their hunting ground. It was made a crime for the ordinary inhabitant to hunt any wild animal. To some extent this law, curiously enough in this age of democracy, still stands on the statute books. The forests thereby became identified with the power and tyranny of the court, and the common people had no interest therein. Indeed such interest as they had was only of hostility. Then when our forefathers crossed the main and came to this new country with its apparently inexhaustible forests, they found for a time that the forest was the covert of their two deadly enemies, the Indian savage, and his yet deadlier ally, malaria. So it was natural, possibly even

necessary, that the forests should be cut down. To conquer the wilderness and turn the forest into arable land which would support life was their first duty, and the toil which it entailed has remained to the present day in the memory of men to render them not only indifferent but hostile thereto. I think it is not too much to say that this is the state of mind of a large portion of our population, nor is it too much to say that the government could not proceed with its educational work in any direction with better results than by teaching the people of this country the principles of forestry.

I fell in, not long ago, with a young man, a neighbor of mine and a man of industry, a sensible man and a thrifty man, who had taken a piece of wild woodland and had cleaned it up with his own hand. He had married and built a snug little house on a hill commanding a fair prospect, and then he had laboriously cut down every one of the fine trees which surrounded his house. Finding him one day in his new ground preparing for his tobacco crop I expressed my wonder that he should have destroyed the fine oaks whose stumps about his house showed their former grandeur. "No," he said, "I do not like trees. I want nothing about my house bigger than a bush except fruit trees." I believe that he expressed the view of a considerable part of our population, and this view is not confined by any means to the laboring class. If you will take a ride around Washington tomorrow you will see such a cutting down of trees and destruction of the natural beauty about this capital of our country as possibly is not to be witnessed today within the same distance of any other capital in the world. I am happy to say that following the design of those broad-minded men who laid out this capital city on broad lines, its streets and avenues are beautified with trees in a way to do honor not only to their wisdom but to the wisdom of those who have the capital still in charge. But, though much is done, much remains to do, and there is even now within the heart of Washington a region where beautiful trees still remain, which unless it receive the vast care and protection of the government which the government may well give here in its own capital, must soon pass away.

I rejoice at this new movement in the direction of preserving our forests. No thoughtful man who recalls the destructions in half a generation of the buffalo and elk and canvas back duck and other forms of game, and who has seen the disastrous destruction of forests, especially no man who has traveled in other countries, can fail to be apprehensive of the effect of the universal indifference to the preservation of forests which essentially obtains in this country. My opinion is that the abiding work of the forestry department will be the awakening in the public mind of the necessity of preserving forests, and the convincing of the public mind, for we are a thrifty race, at least, if not an avaricious race, that it is to the individual's interest to harvest his timber in a scientific rather than in an ignorant way. Show the American people that it is to their interest to do anything and eventually they will do it. Partly stupid and partly over-confiding, they are often misled as to their own interests, but prove to them that it is to their interest and a thing will inevitably be accomplished in the end, and, above that, prove to them that a thing is right and it will be even more inevitably accomplished.



HARVESTING THE ANNUAL SEED CROP

By SYDNEY MOORE,

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EVERY fall sees the harvesting of one crop throughout the mountainous, forested region of the West, which is not mentioned in any official "crop reporter;" a crop which few people outside of those directly concerned in its harvesting know much about, but a crop that is yearly increasing in quantity and value. It is the annual crop of forest tree seed, and the size of each year's crop is of real concern to the country at large, since the seed harvested is chiefly used in the reforestation of the vast burned and denuded areas of the Rocky and Pacific Coast mountains.

The collection of forest tree seed by commercial collectors has been carried on to a limited extent for many years in a few localities in the West. There is one professional collector in the Black Hills of South Dakota who for years has been gathering western yellow pine seed for sale to seed dealers, and has also exported quantities to Europe, especially Germany, where the business in tree seed is very extensive. There is a small village in the mountains near Pueblo, Colorado, where about a dozen individuals have built up a considerable industry of the collection and sale of tree seed. In 1909, the value of the seed crop from this one locality was about \$8,000. These collectors sell their crops to seed dealers in this country and also to dealers in Germany. For a number of years there has been a very active demand from German dealers for seed from the United States, especially of Douglas fir. In fact, until the last two or three years, the export trade in forest tree seed has probably fully equaled the domestic trade, and the whole business has been very restricted. Recently this condition has changed, due to the fact that the Forest Service of the United States Department of Agriculture has undertaken an extensive campaign of reforestation by seed sowing upon the national forests, which demands immense quantities of forest tree seed of desirable species. And while the government collects by far the greater part of its tree seed through its own forest officers, still a considerable amount is purchased from commercial collectors.

The conditions and work of harvesting the seed crop described in this article are particularly typical of the Rocky Mountain region, and the work as carried on by the Forest Service upon the national forests of that region. The forests of the Rocky Mountains, as is well known, consist almost exclusively of coniferous species, in contradistinction to the prevailing broadleaf forests of the East. Consequently, the important seed crop consists of the seed of conifers, or evergreen trees. Although the forests contain a variety of species of trees, including western yellow pine, Douglas fir, lodgepole pine, Engelmann spruce, blue spruce, limber pine, bristle-cone pine, balsam, white fir, and junipers, only the first four named are of special commercial importance. Consequently it is the seed of these four species that is chiefly sought after for reforestation purposes. Even though the future forest is to serve primarily the purpose of protecting some watershed from floods and erosion, it is advisable to plant the seed of some species that will at maturity yield valuable commercial timber.

LOCATING THE CROP.

Coniferous trees do not produce a full crop of seed every year, but only periodically, as every two, three, or four years. In a year when the production of seed by a certain species is very large, commonly called a "good seed year," the heavy production will extend over a very extensive area, as for example, an entire state. In other years the same species may produce a full crop, or nearly so, over a much more limited area. For instance, the yellow pine has been found to produce a heavy crop of seed on a certain small watershed, when little or no seed at all could be found on other yellow pine trees outside of the particularly favored locality. During the past season, seed of Douglas fir in Colorado could be found in large quantities upon only one or two of the eighteen national forests in that state, although in 1909 its seed production was fairly widespread through the state. The fact that the production of seed is very apt to be localized makes it necessary every year to search the forests for the much desired crop. On the national forests the Rangers, each for his respective district, scour the forests to ascertain upon what watersheds, large or small, the trees of the desired kind are bearing seed.

The seed of the important conifers is borne in a cone (whence the name), and with the pines it requires two years for these cones to grow to maturity, while with the other species (spruces and firs) only one year is required. The new cones begin to form in the spring of the year, shortly after the year's growth begins. Thus the forest rangers can begin to locate and take stock of the year's seed crop during June, July, and August, although the crop will not be mature until September or early in October. Each ranger makes a report upon the kind and size of the seed crop upon his district early in the summer, and plans are laid well in advance for gathering in the crop.

TIME AND METHODS OF COLLECTING CONES

The seed crop matures naturally about the time of the first frosts in the fall, and in the mountains this time varies, of course, with the altitude. In the case of the desirable species, the cones open naturally while still upon the tree and release their seed. Accordingly, collectors must gather the cones before they open naturally, otherwise the seed would be lost. Since the seed are ripe in the cones for some little time before they are released naturally, it is possible to gather the cones with the seed in them. Collecting has been started as early as September 1, and continued as late as October 20, though this period varies somewhat with the season.

The cones which contain the seed, then, are what is collected, and not the seed itself. There are several methods of collecting the cones, which shall be described briefly, as follows: (1) climbing trees and picking; (2) picking from the ground, from low scrubby trees; (3) picking from felled trees; (4) collecting from squirrel hoards.

1. Climbing trees and picking: When the cones are gathered by this method, the collector is usually equipped with a pair of "climbers" like those ordinarily used in climbing telephone poles. The cones may be picked by hand from the branches, but more commonly the collector uses a sharp steel hook fastened securely to the end of a light pole about six feet long. With this hook he can cut the cones from the more remote branches or draw the smaller branches toward him so as to reach the cones by hand. As the cones are picked or cut off, they are dropped to the ground, to be gathered up later into sacks, or an assistant on the ground gathers them as fast as they fall. The quantity of cones which can be collected per day in this manner varies a great deal, depending primarily upon the abundance of the cones. Collectors have actually gathered from two to five bushels of yellow pine

cones per day, by steady work. However, as may be imagined, this method is slow and costly, and frequently the size and height of trees in the virgin forest prevents collecting in this way.

2. Picking from the ground, from low scrubby trees: While this method is much easier and less expensive than the former, it cannot be widely used, because the species most desired do not grow in open, park-like forests of short trees over any very extensive areas. Cones of yellow pine and lodge-pole pine have been collected in small quantities by this method, but it can never serve for obtaining any very large part of the seed crop.

3. Picking from felled trees: This method is, of course, restricted to picking cones from the tops of trees cut down where lumbering operations are in progress. As might be suspected, there are many limitations on this method. Even if there is a heavy seed crop where cutting is going on, only a comparatively few trees are cut in ordinary logging operations within the brief period during which cones must be collected. Occasionally, with all conditions favorable, a large quantity of cones can be collected very cheaply in this manner, where timber sales are in progress on the national forests. But at the best, the method can only be infrequently employed.

4. Collecting from squirrel's hoards: Almost everyone has at some time observed the squirrels working very busily in the fall of the year, cutting off cones from the trees in forests of pine or spruce. These indefatigable little workers, chattering in the tree tops, scurry along the slightest branches and with sharp teeth cut the cones from the tips of the branches and drop them to the ground. The topmost, swaying twigs of the tallest pine in the forest hold no fear for the surefooted little creatures. In places where the squirrels are numerous and working their hardest, there is a continuous rain of cones from the tree tops, causing a noise and disturbance that must attract the attention of the most indifferent observer. After the cones are cut off, the squirrels collect them from under the trees and accumulate them in one place, the pile of cones constituting the hoard or "cache."

The squirrels show many peculiarities and much wisdom in locating and arranging these hoards of cones. In general the hoards are located at the base of a standing tree, against or under an old fallen tree, in a hollow log or stump, and often along the bank of a small stream under water. Sometimes the hoards are located in the open, away from any trees or logs. Usually, the spot selected for hoarding cones has been used for the same purpose several successive years and is readily recognized by the deep accumulation of old cone scales, since the squirrels break up the cones to extract the nutritious seed. The cones, when freshly cut from the trees, are in a green condition and full of moisture. If these cones are piled in an indiscriminate mass they soon begin to mould, and in the course of time will decay and the enclosed seed will be spoiled. The instinct of the squirrels teaches them to guard against the possibility of such an unfortunate occurrence. Instead of piling cones in a solid mass, the squirrels' hoards are carefully formed of many little bunches of cones, each bunch containing a dozen or more cones, buried in the forest litter and separated from the other bunches by surrounding litter. This arrangement insures the thorough aeration of the whole mass and prevents any destructive growth of mould. The hoarding of cones under water, which has been mentioned, is another clever scheme by which the squirrels preserve their winter's supply from possible decay, a sort of "cold storage" system devised by these little animals.

It is by taking advantage of the thrifty habits of the squirrels that seed collectors can gather cones most economically and in large quantities. The cone gatherers search through the woods for the hoards which have been described, and fill their sacks with the cones so conveniently cut from the

trees and collected together by the squirrels. The quantity of cones which may be gathered from a single squirrel hoard ranges from a few bushels to a dozen or more bushels. Among the large hoards recorded is one that yielded about sixteen bushels of yellow pine cones, another that yielded about fifteen bushels of Douglas fir cones.

At different times a more or less hysterical protest has been raised by some people against this so-called robbing of the squirrels. Persons interested in the preservation of our wild animals have alleged that this method of collecting cones would result in the starvation of the squirrels. If such were the case, it would indeed be a calamity. As a matter of fact, such gathering of cones from the squirrels' hoards as is done, while it may inconvenience the squirrels, has no disastrous results. The squirrels continue their labor after a hoard has been cleaned out, and in a very short time have a supply on hand equal to that which has been lost. In collecting cones, the gatherers work over an area only once, and then seek new fields, leaving the squirrels ample time to recuperate their losses before winter sets in. It would require a very strenuous and vindictive campaign on the part of man to steal from the squirrels of any locality so persistently as to reduce the winter's food supply of these animals to a dangerous point. Assuredly the wanton destruction of squirrels' hoards is a thing to be condemned, but so long as man takes for himself only a portion of their supplies, and that for a most useful and beneficial purpose, the practice should need no further justification.

EXTRACTING THE SEED.

After the cones have been gathered, by any of the methods which have been described, and placed in sacks, they must be transported to some central point where the seed may be extracted. The sacks of cones gathered in the woods are carried out to the nearest trail or wagon road. Frequently the cones have to be collected in such inaccessible localities that it is necessary to pack them for miles on horses or burros, which is, of course, a tedious and expensive method of transportation. As soon as a road is reached the cones are loaded into wagons. In one region, the Black Hills of South Dakota, where about twenty-five thousand bushels of yellow pine cones were collected during the past fall, pine cones were shipped by railroad, in carload quantities, to a central point, the railroad company making a new rate for this unusual class of freight.

After the cones have been gathered in large quantities at a central point, the most expensive part of the work of collecting seed is accomplished. But the work of extracting the seed from the cones, and cleaning the seed, remains to be done, and this part of the operation requires much care and attention.

Mention has already been made of the natural opening of cones allowed to remain upon the trees. The ripening of cones is brought about by the sun's heat, as with all other fruits, and when the cones are fully ripened they become completely dried out and the cone scales have curled back, releasing the seed, which is distributed widespread through the agency of the winds. Each little seed has attached to it a small membranaceous wing, that serves to carry it through the air to a greater or less distance from the parent tree, depending upon the velocity of the wind and the weight of the seed.

To obtain the much desired seed, it is, then, necessary to open up the cones that have been collected. There are two methods ordinarily employed to accomplish this, one method following Nature's way, takes advantage of the sun's light and heat, and the other method employs artificial heat.

In the first method the cones are spread out thinly upon canvass sheets laid upon the ground, preferably on a gentle slope toward the southwest and the sun. Since the cones must be spread thinly, a large number of



SCREENING PINE CONES TO FREE THEM FROM
PITCH, NEEDLES, AND OTHER REFUSE BE-
FORE SPREADING ON SHEETS TO DRY



HARVESTING THE ANNUAL SEED
CROP

DOUGLAS FIR CONES SPREAD ON CANVAS
SHEETS TO DRY IN THE SUN



SEED COLLECTORS' CAMP WITH CONES SPREAD
OUT TO DRY UPON CANVAS SHEETS



HARVESTING THE ANNUAL SEED
CROP

RAKING YELLOW PINE CONES OFF CANVAS
SHEET AFTER THEY HAVE BEEN RUN OVER
SCREEN AND SEED EXTRACTED. A SMALL
AMOUNT OF SEED IS SAVED BY THIS OPERA-
TION



SEED COLLECTION CAMP IN A ROCKY MOUNTAIN NATIONAL FOREST. SACKS ARE FULL OF CONES GATHERED IN SURROUNDING FOREST



HARVESTING THE ANNUAL SEED CROP

FOREST RANGER WINNOWING YELLOW PINE SEED AFTER TRAMPING IN A SACK TO SEPARATE THE WINGS



FOREST OFFICERS OPERATING A FANNING MILL, THROUGH WHICH SEED IS RUN FOR ITS FINAL CLEANING. ALL DUST, BROKEN WINGS, AND LIGHT SEED ARE BLOWN OUT FROM GOOD SEED



HARVESTING THE ANNUAL SEED CROP

PORTABLE CONE DRYING PLANT ON A NATIONAL FOREST. TENT EQUIPPED WITH WIRE SCREEN, TRAYS, AND A HEATING STOVE

canvas sheets are required to handle a comparatively small amount of cones. The cones must be covered over on rainy days and during cloudy, damp weather. To open up yellow pine cones satisfactorily they must be exposed to the sun in the manner described for about a week. Douglas fir and Engelmann spruce cones, having thinner cone scales, ordinarily dry out and open in less time than those species with thicker cone scales. However, the time required to open up cones in the sun varies greatly, depending upon the weather conditions and the relative dryness of the cones at the time they are spread upon the sheets for final drying.

The sun-drying method has the great advantage of being inexpensive, since the only equipment required consists of canvas sheets, the cheapest obtainable being used for the purpose. Furthermore, the drying sheets are easily transported (on pack-horses if need be) to remote places where the cones have been concentrated, and the extracting process carried out there, a very important consideration in our mountain forests, difficult of access. The great limitation upon this method is, of course, its absolute dependence upon a continuous period of fair weather, with sunny, dry days.

By the second method of extracting seed, which uses artificial heat, the cones are subjected to a temperature ranging from 100 to 120 degrees Fahrenheit for a period sufficient to open them. The cones are spread out thinly on shelves or trays of wire mesh in a closed room, but with sufficient ventilation to insure the escape of the moisture given off from the drying cones. As with sun-drying, the time required to dry out the cones is variable. Yellow pine cones under ordinary conditions will open up satisfactorily with a temperature of 100 degrees maintained for thirty-six to forty-eight hours.

Two types of cone-drying plants may be distinguished, namely, portable and stationary. A convenient form of portable plant consists of an ordinary canvas tent, in which drying trays can be built and a stove set up. A permanent drying plant may be constructed in any tight building where trays can be built and a stove or furnace installed. Because of the cost, a stationary plant is only advisable where large quantities of cones are available for drying, or can be easily transported to the plant. The advantages of drying cones by artificial heat are apparent, the process being carried on independent of weather conditions.

Whether dried by the sun's heat or artificial heat, the cones, as they gradually open, release the seed and a large portion of the seeds from each cone fall out upon the canvas sheets or drying trays whenever the mass of cones is stirred or handled. However, a certain portion of the seeds stick in the cones even after they have opened and most of the seeds have fallen out. In order to extract these refractory seeds the opened cones must be given a special treatment. The cones are gathered up from the sheets or trays upon which they have dried, and put into a contrivance called a "churn." This churn is merely a large box, about three feet square, mounted upon a frame so that it can be revolved by means of a crank. One side of the churn is covered with wire screen or slats, which permit the passage of seed but retain the cones in the churn. As a man revolves this churn, the cones are rattled about vigorously and the remaining seed shaken out of them. This churning process is commonly spoken of as "threshing" the cones.

CLEANING THE SEED

From the drying-sheets or trays the seed collector gathers up the seed extracted and adds to the mass the seed he has shaken out from the churn. The material which he has thus obtained is not exclusively clean tree seed by any means. The individual seeds still have attached to them the little membranaceous wings, and intermingled through the mass are broken seed wings.

cones scales, bits of dirt and refuse matter of all descriptions. In addition, a great many of the seeds themselves, while perfectly good in external appearance, are in reality abortive or "light" seeds, that is the kernel has never fully developed, so that the seeds would never germinate. What the seed collector desires, and what he must have if he hopes to market his crop, is perfectly clean, sound seed free from all wings, dirt or other refuse.

The next step, therefore, is to remove the wings from the seeds. This may be done by simply rubbing the seeds together with the hands, thus breaking off the thin, brittle wings. Often the seed is rubbed over a fine mesh screen, by hand, or a small quantity of the seed may be placed in a sack and then rolled and rubbed with the feet. Sometimes the seed are dampened slightly with water and then rubbed, the effect of the water being to loosen the wings from the seed. After the seed has been handled by some one of these methods it is given the final treatment, which consists in separating the good seed from the "chaff," the latter including wings, broken cone scales, and the other refuse. For this final cleaning the seed may either be winnowed in the open with a light breeze, or it may be put through a fanning mill, such as is commonly used in cleaning grain. The former method is a crude one, and a fanning mill is almost a necessity to clean seed satisfactorily and economically on a large scale. Frequently the seed may be winnowed to remove a portion of the chaff, and later given a final run through a fanning mill.

It has already been mentioned that in the Rocky Mountain forests it is often necessary to collect the cones in remote localities, more or less inaccessible to cheap transportation. In such cases the seed is seldom put through the various processes in one place. More frequently the cones are opened by the sun's heat in the locality where collecting is done, and the seed and chaff are then transported to some central place where the seed is given its final cleaning. By this scheme the transportation of the heavy, bulky cones is avoided, and the cost saved on the final product. When the seed has been satisfactorily cleaned, it is placed in seamless sacks and carefully stored, ready for distribution to the points where it will be used to grow new forests.

The amount of clean seed which is ultimately obtained from a bushel of cones varies with the species of seed, with the favorableness of the season, and with the care used in the work of extraction and cleaning. Rocky Mountain yellow pine will yield on an average one pound of clean seed from a bushel of cones, though frequently it exceeds this somewhat. Douglas fir yields about one pound of clean seed per bushel of cones.

The business of collecting forest tree seed is of large importance to private individuals in many localities, but the total amount of such seed collected privately is insignificant in comparison to the quantities being collected annually by the federal forest service throughout the west. As time passes, the annual tree seed crop will increase in amount yearly. With the perfection of methods for harvesting the crop, the cost per pound of the several important species will decrease, a matter of much moment, since an abundant supply of cheap seed is the first essential to the vast undertaking of reforesting the millions of acres of burned and cut-over lands throughout the forest regions of the western United States.

GROWING TREES FROM SEED

By C. R. PETTIS,

SUPERINTENDENT OF STATE FORESTS OF NEW YORK.

THE idea of reforesting land is, at present, most popular and there is a rapidly increasing demand for information how to best undertake the work. In the eastern states where conifers with shallow root systems will be most generally planted, the best method is to plant small trees grown in a nursery. On account of the importance of the conifers, hardwoods will not be discussed in this article. The size and kind of tree to be used will depend upon soil, demands of the owners and other circumstances, but the method will be the same.

The first step in any reforesting operations will be securing the stock, and as the money is invested for a long period the cost of such plants should be carefully considered. There are certain kinds of trees that can be purchased abroad and imported apparently much cheaper than they can be secured in this country, but this is in the long run rarely, if ever true, of forest planting stock. The state of New York has imported a large quantity of various species and planted them. These plantations at first appeared satisfactory, but later examination showed that they are, in some cases, affected with serious diseases, and in others the per cent of loss is very high on account of the long transit and other factors. The quality of the stock is also a factor in considering price and final success. The stronger and thriftier the tree the more successful the plantation.

If any owner desires to plant but a few acres each year it will be more advantageous for him to secure stock from his state forest commission, if it is in a position to supply him, or from a reliable nurseryman. Any successful nursery operated at reasonable cost requires a large annual output and experienced supervision. The most economical method for any small planter who desires to use transplants will be to purchase seedlings and then transplant them at home, thus reducing packing and transportation charges in the first instance, and having any advantage of local labor for their care. He will also be assured of the quantity desired when wanted.

Four things are essential for a successful nursery: (1) good soil; (2) good seeds; (3) a water supply; and (4) proper methods.

The soil should be a rich loam, free from stone, thoroughly cultivated, preferably with garden crops before using, well fertilized, well drained, and with sufficient slope to effect surface drainage. The better the soil the more vigorous and larger the plants. The absence of stones facilitates transplanting and tends to reduce expenses. Previous cultivation, if the weeds have not been allowed to mature seeds, decreases the weeding. The production per acre is so large that any soil can be profitably used.

Good seeds are absolutely necessary because no matter how carefully all the other work may be done, satisfactory seed beds cannot be secured without seeds of high germination per cent and full of energy. Seeds should be purchased only after examining samples. Good seeds are heavy, rich

in oil and full of meat. Seeds should be purchased late in the fall and stored in tight tin cans in a cold building.

A continuous water supply is essential. The control of moisture conditions in the soil is of greatest importance in securing success. The soil should be well drained and not heavy, in order to reduce the surface moisture, while water should be provided when necessary. In our practice we have found that the growth of seedlings can be increased at least two inches a year by the proper application of water. Water is also necessary to retain proper moisture conditions in the seed beds and effect germination. During periods of drought large quantities should be applied to the young transplants.

The methods to be employed will depend upon the local conditions in minor points, but in general the following will apply to our northeastern states. The various portions of the work will be considered in the following order: (1) making the seed bed; (2) care of seedlings; (3) the transplanting; (4) care of transplants; (5) packing stock.

The seed beds four feet wide and twelve feet long are the most convenient, and such a bed will produce from 5,000 to 12,000 seedlings, each depending upon the success of the work. Each bed should be enclosed in a frame* covered with wire netting to exclude the birds who destroy the young trees by eating the seeds which are on the tip top of the young plants. This box is placed in position, the soil carefully prepared, the bed is made with a gentle slope about one and one-half inches higher in the center than at the outside and the surface of the bed about four inches higher than the path. The soil should then be saturated with water and the seeds sown carefully broadcast over the bed. The quantity of seed to be sown will depend upon the size of the seed which varies with species and is as follows: White pine, 12 ounces; Scotch pine, 8 ounces; Red pine, 6 ounces; Norway spruce, 8 ounces; European larch, 12 ounces. These seeds should then be pressed into the soil and covered lightly to a depth of about one-eighth of an inch with sterile soil carefully sifted. The box should then be tightly enclosed to retain the moisture and left for germination. Care should be exercised that the soil continues moist in order to supply the necessary water to germinate the seeds. The seeds should be sown about the time garden seeds would be planted.

After two or three weeks the seeds will begin to germinate and at that time need careful attention. Up to this time it has been necessary to produce moist, humid conditions in the seed bed, but as soon as germination takes place it will be necessary to reverse the conditions and full ventilation and dry surface soil will be necessary in order to prevent "damping off." This is the most serious difficulty in seed bed work. It is a fungus disease which destroys the tissues at the surface of the soil and the trees apparently wilt, but as a matter of fact are suffering from this disease. The best remedy is prevention effected by removing any unnecessary dampness. Just as soon as germination has been secured all the covering used to conserve moisture during the germination period should be removed and from that time on during the remainder of the first season only half shade of lath should be used.

The beds should be carefully watched during the season. All weeds should be removed when small and the weeding done often. In case of dry weather, water should be applied late in the afternoon. Late in the summer the wire covering and lath shades should be removed to "harden" the trees for winter. In early winter, after a few inches of snow has fallen, the beds should be covered with one thickness of burlap over the snow.

*Detailed information in regard to the construction of such boxes will be found in Bulletin No. 76, Forest Service, Washington, D. C.



SEED BED NURSERY AT LAKE CLEAR JUNCTION, NEW YORK, CONTAINING THREE MILLION SEEDLINGS IN TWO ACRES



GROWING TREES FROM SEED

THE STATE OF NEW YORK NURSERY AT PALAMANCA



REFORESTATION IN MASSACHU-
SETTS

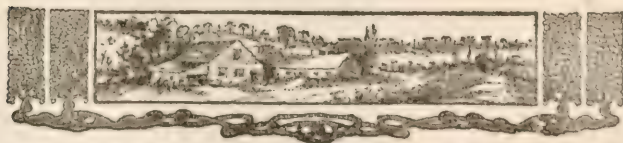
THE FOUR STEPS IN PLANTING
A SEEDLING

The coming spring after the danger from "heaving" of the soil has passed the burlap should be removed. During the summer the beds should be kept free from weeds and freely supplied with water. The two-year-old beds do not need covering during the winter.

When the seedlings are two years old they are suitable for planting in the field, where there is but limited shade, and upon fair quality of soil. If larger and stronger trees are necessary they should be transplanted in the nursery. The seedlings should be taken up carefully in order not to injure any roots and the roots at all times kept from exposure to sun or wind. The transplant beds should be about seven feet wide and any length, but fifty feet has been found convenient. The paths should be two feet wide and the beds almost four inches higher than the paths. The "Yale Planting Board," invented by Prof. J. W. Toumey, has proved a most valuable tool and greatly reduced the cost of transplanting. The work with this board is carried on with five men in a crew using two boards. The board consists of two strips hinged by arms at right angles, one of them continuously notched the space the trees are to be apart in the rows. In this the trees are placed and upon it the other closes, holding them in place. Two men are employed digging the trench, two placing the seedlings in the boards and one man carries the board to and from the trenches. While two are filling the boards, two others are making the trenches into which the fifth man places the board filled with trees, then the soil is packed around the roots and the board removed. The trees are placed rapidly and regularly and the roots in normal position. The trees should be three inches apart in the rows and the rows six inches apart. This process is continued until the transplanting is completed.

The care during the season consists chiefly in weeding and watering in times of continued dry weather. A careful watch should be kept for insect pests or ground grubs. If the trees are not sufficiently large at the end of the one season in the transplant bed, they may be retained there another season.

When the trees are ready for field planting they should be carefully taken up to prevent any injury to the roots, promptly "heeled in" and finally planted as soon as possible. Spring planting is, as a rule, more desirable than fall planting. The trees, if shipped even a short distance, should be carefully packed in order to prevent any drying of the roots. If shipped a long distance they should be packed right, the roots packed in moss and sufficient openings left around the upper parts to prevent heating.



REFORESTATION IN MASSACHUSETTS

By F. W. RANE,

STATE FORESTER OF MASSACHUSETTS.

AS a result of the educational campaign carried on by the Massachusetts Forestry Department there has been a general awakening on the part of the public, especially land owners, to the opportunities which this field affords for profitable investment and future development by reforestation in the Bay State. This widespread interest has been manifested during the past year by the great number of requests that have been made by clubs, granges, boards of trade, and other organizations throughout the state for lectures on this subject, as well as innumerable requests received by mail for literature treating of the subject. The press has also been no small factor in urging upon the people the importance of reforestation.

It must be quite obvious to every thinking person that to a state whose present stock of woodland is second and third growth, most of it consisting of sprouted trees which never become timber size, and which has nearly a million acres of land which may properly be classed as waste land, largely abandoned rough fields and so-called natural pastures growing up to brush, reforestation becomes a question of vital interest. Even forty or fifty years ago there were far-sighted men in Massachusetts who predicted the total extinction of our timber supply unless remedial measures were taken in season to prevent it, and quite a strong feeling pervaded the state in favor of planting commercial trees, but with the decline in farm values the enthusiasm abated, not, however, until fifteen or twenty small plantations had been set out by individuals in their private capacity. These plantations were small, of course, averaging ten to twenty-five acres.

As the white pine is a natural conifer of Massachusetts, a tree of comparatively rapid growth, and especially adapted to the soil of this region with its lumber in great demand, it is very natural that it should be given preference over all others in the work of reforestation. In fact, the first work of importance done by the present state forester after taking charge of the forestry work in this state was to make a study of its growth, with the result that in "Forest Mensuration of White Pine," a bulletin published under his direction, are to be found fairly complete data concerning the white pine. This bulletin shows, for instance, that the age at which a plantation should be cut to yield the highest net returns is 50 years, and that an acre of pine planted on average soil will produce at the rate of 900 board feet, or more, per year. This information is of great value to farmers, as it makes clear to them how the waste land of farms may be utilized and made to become of constantly increasing value. Supposing the value of land at the time of planting to be \$6.00 per acre, the cost of planting \$10.00, taxes at two per cent, an acre of pine will yield four per cent on the money invested, and \$270 besides, a total of between six and seven per cent. These figures are based on the present prices of lumber, and not the probable prices fifty years hence.



WHITE PINE SEEDLINGS, SET FIVE YEARS,
ABOUT THE WACHUSET RESERVOIR OF THE
METROPOLITAN WATER SYSTEM.



A PINE PLANTATION THIRTY YEARS OLD ON
THE SANDS OF CAPE COD

REFORESTATION IN MASSACHUSETTS



MASSACHUSETTS STATE NURSERY AT AMHERST; TRANSPLANTS IN FOREGROUND

HEALTHY WHITE PINE
AND AT SUDBURY,
MASSACHUSETTS,
PLANTED THIRTY-EIGHT
YEARS.



THE MASSACHUSETTS STATE FORESTER'S MEN
AT WORK PLANTING.

Money Yield Table.

Manufactured and stumpage values.

AGE (YEARS).	QUALITY I.					QUALITY II.					QUALITY III.				
	Vol- ume.	Per M. Ft.	F. O. B. Value.	Per M. Ft.	Stump- age.	Vol- ume.	Per M. Ft.	F. O. B. Value.	Per M. Ft.	Stump- age.	Vol- ume.	Per M. Ft.	F. O. B. Value.	Per M. Ft.	Stump- age.
25. . .	Bd. Ft. 10,825	\$16 00	\$173 20	\$6 00	\$65 00	Bd. Ft. 6,750	\$16 00	\$108 00	\$6 00	\$40 50	Bd. Ft. 3,975	\$16 00	\$63 60	\$6 00	\$23 85
30. . .	19,900		318 40		119 40	12,500		200 00		75 00	7,500		120 00		45 00
35. . .	31,150		498 40		249 20	24,400		439 20		195 20	16,950		271 20		101 70
40. . .	40,650		791 70		325 20	32,800		590 40		262 40	25,200		403 20		201 60
45. . .	49,350		888 30		394 80	40,600		730 80		324 80	32,100		577 80		256 80
50. . .	55,150	\$18 00	992 70	\$10 00	551 50	46,500	\$18 00	837 00	\$10 00	465 00	37,550	\$18 00	676 00	\$10 00	300 40
55. . .	59,650		1,193 00		596 50	50,550		910 00		505 50	42,100		757 80		336 80
60. . .	63,600		1,272 00		763 20	53,200		1,064 00		532 00	44,550		802 00		445 50
65. . .	67,050		1,341 00		804 50	56,600		1,132 00		566 00	46,150		830 70		461 50

The legislature, within the past five years, has recognized the immense possibilities of forestry as a factor in adding to the wealth of the state, and has enacted several laws based upon recommendations of the state forester, intended to advance it. The reforestation act of 1908 has enabled the state forester to make a most promising beginning, about forty separate plantations covering 2,000 acres at an average cost of less than \$10.00 per acre having already been made. Much of this land was acquired by the commonwealth under the provisions of the law which allows owners to turn over land to the state for the purpose of reforestation, reserving the right to redeem the land at any time within ten years, for the actual amount expended. Nearly fifteen hundred acres of land are now in the hands of the state forester ready for planting next season.

Previous to this year most of the trees planted were purchased from nurserymen, but last spring our nursery at Amherst, established three years ago, supplied about half of the one million seedlings used, and henceforth will furnish a large percentage of those required. This nursery, which is on the grounds of the Massachusetts Agricultural College, covers seven and one-half acres, and has in stock about two million pine seedlings, one half million Norway spruce, and several hundred thousand other species. Another nursery has been laid out at Sandwich on Cape Cod, but so far only one-half an acre has been utilized.

The plantations scattered all over the state have been of great interest to property owners, and have done much toward stimulating private enterprise along this line. The records at the office of the state forester show that in addition to the 2,000 acres planted under his direction, 2,000 acres have been planted by private parties and 1,500 by other agencies, principally the Metropolitan Water and Sewerage Boards.

So gratifying has been the progress made in the work of reforestation up to the present time, and so wide are the possibilities in this direction that a much larger appropriation has been asked for this year in order that operations along this line may be greatly extended.

THE PASSAGE OF THE APPALACHIAN BILL

ON THE 15th of February the long struggle for national legislation looking to the perpetuation of the forests of the Southern Appalachian and White Mountains was ended when the bill known as the Weeks, or Appalachian bill, was passed by a vote of 58 to 9. As it had been passed by the House in June of last year and was enacted by the Senate without change, it only remains for it to receive the signature of President Taft to become a law.

Between twelve and one o'clock, immediately at the close of the morning hour, the bill was called up by Senator Brandegee of Connecticut, who had it in charge. Senator Stone of Missouri, who had offered an amendment, withdrew it. Senator Brandegee then reviewed the legislative history of this bill in the Senate and the bill was read. The Senator from Connecticut made a brief and admirable opening statement and answered several questions, after which Senator Burton of Ohio addressed the Senate for over two hours in opposition to the bill. During this time he adduced nothing new. The Senator's secretary sat beside him with a ponderous array of volumes, pamphlets and documents, but his arguments and citations, which were numerous, were the old familiar ones which have been answered again and again.

Senator Newlands of Nevada spoke about an hour. He explained that he was in favor of the bill and desired its passage, but that his purpose in opposing it in its present form at the last session was "not to defeat the bill, but to anchor it more firmly in the interstate commerce power of the Constitution, and enlarge its area so as to provide a comprehensive scheme of legislation that would involve the regulation of the flow of all the navigable rivers of the country in aid of navigation, and accomplish that ultimate object by the storing of the flood waters of these rivers, including the sources of streams for purposes of irrigation and power; by the protection of forested areas included within the watersheds of such rivers and their sources, so as to prevent precipitate run-off and safeguard against denudation and erosion; by the protection of the river banks by revetment and levees, so as to confine the rivers to their channels, and thus aid in the reclamation of vast areas of swamp and overflowed lands within the drainage basins of such rivers containing an alluvial soil of enormous fertility and requiring only protection from flood waters to insure their highest agricultural development." He further explained that since there seemed to be a well grounded fear that the pressing of amendments at this time would endanger the passage of the bill, which he did not wish to do, he should withdraw his amendment and seek to accomplish his object through a more comprehensive piece of legislation at a later time. He summarized with much skill and clearness the arguments for the bill and devoted considerable time to the plan of a great national waterways system which is his special interest in legislation.

Mr. Newlands' position was a matter of gratification to friends of the bill because he has always been accredited a friend of progressive forestry legislation and it was a great disappointment to find him ranged apparently with opponents of this bill at the last session.

The next speaker was Senator Simmons of North Carolina, a long-time supporter of the various Appalachian forest bills. He made a carefully pre-

pared argument, reinforced by observations from his own state which is so largely interested in this question.

Senator Heyburn of Idaho, strengthened the case for the bill by his opposition. The point of his remarks was that this bill proposed to buy several counties entire, counties with a large population, of which he gave the figures, and turn them into solitudes. He denounced it is the "most radical piece of fancy legislation that has ever been proposed in the Congress of the United States."

Senator Smith of South Carolina, replied effectively to certain remarks of the Idaho Senator on the effects of erosion.

Senator Burton offered two amendments, the first providing for an examination of the lands to be purchased by the Engineer Corps of the United States Army instead of by the Geological Survey, and the second providing "that on lands acquired by the Commission timber shall be sold and water-power shall be granted only at prices and on terms approved by the National Forest Reservation Commission." Both amendments were rejected and roll calls were refused.

The roll call was then ordered on the passage of the bill and it was passed by a vote of 58 to 9. The vote concluded at about half-past five o'clock in the afternoon. The record was as follows:

Yeas—58

BACON	CURTIS	LODGE	SMITH, Md.
BEVERIDGE	DICK	MARTIN	SMITH, Mich
BOBAH	DIXON	NEWLANDS	SMITH, S. C.
BOURNE	DUPONT	NIXON	SMOOT
BRADLEY	FLETCHER	OLIVER	STEPHENSON
BRANDEGEE	FLINT	OVERMAN	SUTHERLAND
BRIGGS	FOSTER	PAGE	SWANSON
BROWN	FRAZIER	PENROSE	TALIAFERRO
BURNHAM	FRYE	PILES	TAYLOR
BURROWS	GALLINGER	PERKINS	WARNER
CARTER	GAMBLE	RICHARDSON	WARREN
CHAMBERLAIN	GUGGENHEIM	ROOT	WATSON
CRANE	JONES	SCOTT	WETMORE
CRAWFORD	KEAN	SIMMONS	YOUNG
CUMMINS	LA FOLLETTE		

Nays—9

BRISTOW	CULLOM	GRONNA	PAYNTER
BURTON	DAVIS	McCUMBER	SHIVELY
CLARK, Wyoming			

Not voting—24

ALDRICH	CLARK, Ark.	HEYBURN	PERCY
BAILEY	CULBERSON	JOHNSTON	RAYNER
BANKHEAD	DEPEW	LORIMER	STONE
BULKELEY	DILLINGHAM	MONEY	TERRELL
BURKETT	GORE	NELSON	THORNTON
CLAPP	HALE	OWEN	TILLMAN

Of the Senators not voting all but four, Senators Hale, Lorimer, Nelson and Tillman, were placed on record by their pairs. These showed Senators Aldrich, Bulkeley, Burkett, Clapp, Depew, Dillingham, Johnston, Money, Rayner, Terrell and Thornton in favor of the bill, and Bailey, Bankhead, Clark of Arkansas, Culberson, Gore, Heyburn, Owen, Percy and Stone opposed.

There is evidence in this large senatorial majority in favor of the bill that its friends have been very successful in presenting the arguments for it during the last few weeks, because there was undoubtedly a much larger opposition to the measure some months ago than the vote shows at the present time. This is a matter for great congratulation. The bill was in charge of Senator Brandegee who has worked for its success faithfully and efficiently during the session. Closely associated with him on the floor was Senator

Gallinger, who has been actively in the service for this legislation since it was first proposed. For the final success much credit is due to the work of Senator Crane, whose wise counsel and service has always been available in its behalf. On the Democratic side Senators Chamberlain, Fletcher, and Overman have been particularly strong in their support. The text of the bill, as enacted, follows:

AN ACT

To enable any State to cooperate with any other State or States, or with the United States, for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That the consent of the Congress of the United States is hereby given to each of the several States of the Union to enter into any agreement or compact, not in conflict with any law of the United States, with any other State or States for the purpose of conserving the forests and the water supply of the States entering into such agreement or compact.

SEC. 2. That the sum of two hundred thousand dollars is hereby appropriated and made available until expended, out of any moneys in the National Treasury not otherwise appropriated, to enable the Secretary of Agriculture to cooperate with any State or group of States, when requested to do so, in the protection from fire of the forested watersheds of navigable streams; and the Secretary of Agriculture is hereby authorized, and on such conditions as he deems wise, to stipulate and agree with any State or group of States to cooperate in the organization and maintenance of a system of fire protection on any private or state forest lands within such State or States and situated upon the watershed of a navigable river: *Provided*, That no such stipulation or agreement shall be made with any State which has not provided by law for a system of forest-fire protection: *Provided further*, That in no case shall the amount expended in any State exceed in any fiscal year the amount appropriated by that State for the same purpose during the same fiscal year.

SEC. 3. That there is hereby appropriated, for the fiscal year ending June thirtieth, nineteen hundred and ten, the sum of one million dollars, and for each fiscal year thereafter a sum not to exceed two million dollars for use in the examination, survey, and acquirement of lands located on the headwaters of navigable streams or those which are being or which may be developed for navigable purposes: *Provided*, That the provisions of this section shall expire by limitation on the thirtieth day of June, nineteen hundred and fifteen.

SEC. 4. That a commission, to be known as the National Forest Reservation Commission, consisting of the Secretary of War, the Secretary of the Interior, the Secretary of Agriculture, and two members of the Senate, to be selected by the President of the Senate, and two members of the House of Representatives, to be selected by the Speaker, is hereby created and authorized to consider and pass upon such lands as may be recommended for purchase as provided in section six of this Act, and to fix the price or prices at which such lands may be purchased, and no purchases shall be made of any lands until such lands have been duly approved for purchase by said commission: *Provided*, That the members of the commission herein created shall serve as such only during their incumbency in their respective official positions, and any vacancy on the commission shall be filled in the manner as the original appointment.

SEC. 5. That the commission hereby appointed shall, through its president, annually report to Congress, not later than the first Monday in December, the operations and expenditures of the commission, in detail, during the preceding fiscal year.

SEC. 6. That the Secretary of Agriculture is hereby authorized and directed to examine, locate, and recommend for purchase such lands as in his judgment may be necessary to the regulation of the flow of navigable streams, and to report to the National Forest Reservation Commission the results of such examinations: *Provided*, That before any lands are purchased by the National Forest Reservation Commission said lands shall be examined by the Geological Survey and a report made to the Secretary of Agriculture, showing that the control of such lands will promote or protect the navigation of streams on whose watersheds they lie.

SEC. 7. That the Secretary of Agriculture is hereby authorized to purchase, in the name of the United States, such lands as have been approved for purchase by the National Forest Reservation Commission at the price or prices fixed by said commission: *Provided*, That no deed or other instrument of conveyance shall be accepted or approved by the Secretary of Agriculture under this Act until the legislature of the State in which the land lies shall have consented to the acquisition of such land by the United States for the purpose of preserving the navigability of navigable streams.

SEC. 8. That the Secretary of Agriculture may do all things necessary to secure the safe title in the United States to the lands to be acquired under this Act, but no payment shall be made for any such lands until the title shall be satisfactory to the Attorney-General and shall be vested in the United States.

SEC. 9. That such acquisition may in any case be conditioned upon the exception and reservation to the owner from whom title passes to the United States of the minerals and of the merchantable timber, or either or any part of them, within or upon such lands at the date of the conveyance, but in every case such exception and reservation and the time within which such timber shall be removed and the rules and regulations under which the cutting and removal of such timber and the mining and removal of such minerals shall be done shall be expressed in the written instrument of conveyance, and thereafter the mining, cutting, and removal of the minerals and timber so excepted and reserved shall be done only under and in obedience to the rules and regulations so expressed.

SEC. 10. That inasmuch as small areas of land chiefly valuable for agriculture may of necessity or by inadvertence be included in tracts acquired under this Act, the Secretary of Agriculture may, in his discretion, and he is hereby authorized, upon application or otherwise, to examine and ascertain the location and extent of such areas as in his opinion may be occupied for agricultural purposes without injury to the forests or to stream flow and which are not needed for public purposes, and may list and describe the same by metes and bounds, or otherwise, and offer them for sale as homesteads at their true value, to be fixed by him, to actual settlers, in tracts not exceeding eighty acres in area, under such joint rules and regulations as the Secretary of Agriculture and the Secretary of the Interior may prescribe; and in case of such sale the jurisdiction over the lands sold shall, ipso facto, revert to the State in which the lands sold lie. And no right, title, interest, or claim in or to any lands acquired under this Act, or the waters thereon, or the products, resources, or use thereof after such lands shall have been so acquired, shall be initiated or perfected, except as in this section provided.

SEC. 11. That, subject to the provisions of the last preceding section, the lands acquired under this Act shall be permanently reserved, held, and administered as national forest lands under the provisions of section twenty-four of the Act approved March third, eighteen hundred and ninety-one (volume twenty-sixth, Statutes at Large, page eleven hundred and three), and Acts supplemental to and amendatory thereof. And the Secretary of Agriculture may from time to time divide the lands acquired under this Act into such specific national forests and so designate the same as he may deem best for administrative purposes.

SEC. 12. That the jurisdiction, both civil and criminal, over persons upon the lands acquired under this Act shall not be affected or changed by their permanent reservation and administration as national forest lands, except so far as the punishment of offenses against the United States is concerned, the intent and meaning of this section being that the State wherein such land is situated shall not, by reason of such reservation and administration, lose its jurisdiction nor the inhabitants thereof their rights and privileges as citizens or be absolved from their duties as citizens of the State.

SEC. 13. That five per centum of all moneys received during any fiscal year from each national forest into which the lands acquired under this Act may from time to time be divided shall be paid, at the end of such year, by the Secretary of the Treasury to the State in which such national forest is situated, to be expended as the state legislature may prescribe for the benefit of the public schools and public roads of the county or counties in which such national forest is situated: *Provided*, That when any national forest is in more than one State or county the distributive share to each from the proceeds of such forest shall be proportional to its area therein: *Provided further*, That there shall not be paid to any State for any county an amount equal to more than forty per centum of the total income of such county from all other sources.

SEC. 14. That a sum sufficient to pay the necessary expenses of the commission and its members, not to exceed an annual expenditure of twenty-five thousand dollars, is hereby appropriated out of any money in the Treasury not otherwise appropriated. Said appropriation shall be immediately available, and shall be paid out on the audit and order of the president of the said commission, which audit and order shall be conclusive and binding upon all departments as to the correctness of the accounts of said commission.

Passed the House of Representatives June 23 (calendar day, June 24), 1910.

Passed the Senate February 15, 1911.

EDITORIAL

THE APPALACHIAN BILL

THE passage by the Senate on Wednesday of the bill commonly known as the Weeks, or Appalachian, bill ends the first stage of a long struggle for national forests in the eastern mountains, a struggle that began in 1899. The bill now enacted bears little resemblance to those that preceded it up to the time of the Sixtieth Congress, although its purpose has been well understood to be the same, that is, the perpetuation of forests upon the great watersheds of the Appalachian ridge. It is a general law, providing for no particular locality, but there can hardly be a question raised as to its intent or as to the regions which are in present need of action by the nation.

Imperfect as it admittedly is, this new forest law marks a distinct step in advance, and may be said in some sense to be the beginning of a new departure in that it makes our national forest policy really national, although the application of the principle under the new law is greatly circumscribed. This aspect of the question is discussed in another connection.

Under its provisions much good may be accomplished in the nature of forest preservation and protection if it is broadly and generously interpreted by its administrators; but it has been frankly admitted by its advocates that it is acceptable only as a beginning and a means of testing the application of a most important economic principle.

As passed by the House last June, the bill carried an appropriation for the fiscal year ending June 30, 1910, of one million dollars, and for each succeeding year until 1915 of two million dollars annually, making an aggregate of eleven million dollars. Because of legislative conditions, it was necessary to pass the bill in the Senate without amendment and this provision was therefore unchanged. It is, therefore, probable that the first million dollars which was allotted for 1910 will be lost and that only ten million will be available for the purposes of the act. It is not certain, however, that the intent of the bill may not be considered and the full appropriation made available.

The passage of the bill is a notable triumph of enlightened public sentiment over political obstruction. Here was a measure which had the endorsement of three successive Presidents of the United States, of intelligent citizenship all over the land, as voiced by practically every great national organization that is working for the public welfare, by commercial and industrial bodies, by the federated women's clubs of America and an almost unanimous periodical and newspaper press. Notwithstanding such support as would seem to have assured its prompt enactment, it met in Congress from year to year a most stubborn opposition, directed by the leaders of the party organizations on both sides of the House. In the Senate there was a bitter sectional hostility from the northwest, which finally melted away leaving Senators Heyburn of Idaho and Clark of Wyoming, as its sole exponents. Notwithstanding its importance to the south, there was from that section a considerable opposition on the part of adherents of a strict, old-fashioned states rightsism, and the unfavorable influence of party leaders was strong in the middle

west. So far as evidence has appeared, this opposition in our national legislature has had no support outside of Congress, and it is remarkable that it has held out so long against an unusually broad, national and non-partisan public demand.

It is a weakness of the American people to develop great enthusiasms, embody them in law and then forget them, to become absorbed in their daily vocations and in fresh interests. This disposition has nullified many good laws. Let it be remembered in this hour of triumph that the ultimate success of this new forest law will depend upon the continued interest and intelligent support of those whose efforts have secured its enactment. In the face of public indifference it will become a useless instrument. Forcefully and intelligently sustained, it may be the beginning of greater good to the people of the whole country than even its most ardent friends have claimed.

ITS CONSTITUTIONAL ASPECT

THE new forest law in its present form must be regarded as partial, since it provides for maintaining forest cover only on drainage areas necessary for "conserving the navigability of navigable rivers." This is in deference to an opinion given by the Judiciary Committee of a former House of Representatives, and to the views of many constitutional lawyers as to the powers of the general government. We have always deemed it unfortunate that the discussion of this great public question was forced as a matter of expediency into so narrow a channel by the dictum of a political committee which is in no sense a judicial body, although made up of very able lawyers. Its members sit upon the committee as advocates rather than as judges in many cases, and this was especially true in connection with the Appalachian bill, which involved so many points of controversy and had aroused strong feeling. At the time that the opinion was rendered upon the Appalachian bill, several members of the committee, including its chairman, represented the spirit of intense hostility to the measure which guided the action of the leaders of the House organization. Under these circumstances we could hardly expect that an opinion would be rendered such as we should look for from the Supreme Court of the United States.

The views expressed by the committee are not unquestioned and we believe that time will teach the American people that an adequate timber supply, the preservation of the flow of streams for water power and the public health, and the sanitary influence of the mountain forests, are as necessary to the people as the navigability of their rivers, that is, that they are essential to the general welfare. In the debate last summer in the House no arguments for the bill were more gratifying than those of Mr. Mann of Illinois and General Keifer of Ohio, both of whom took a strong stand for the power of the general government to preserve our forests on the ground of the general welfare. Hoke Smith, Secretary of the Interior under President Cleveland and twice elected governor of Georgia, is on record with a similar declaration. None of these men is a radical, or a dangerous loose constructionist. They have with them many lawyers equally able and learned with those on the other side. It is the lesson of our whole history from the time of the Louisiana Purchase, made by the greatest of all the strict constructionists, that when a great national need has arisen, the provisions of the Constitution have been found to be ample to safeguard the nation. In academic constitutional discussions, the general welfare clause is but little regarded. When practical need arises, it is realized that the wise and cautious statesmen who debated almost every word of our great instrument of government, did not insert those words for mere verbiage. They knew what some lesser interpreters of the Constitution seem to forget,

that any such instrument, to be permanent, must provide for national growth and changing conditions. Nothing is more instructive in our history than the prophetic vision with which Washington, Jefferson, Marshall and others of our elder statesmen, looked forward through the years to the development of the nation they were founding. They would never have circumscribed that development by any provision which could have prevented the guarding of the people's welfare against any unfavorable conditions that might arise.

The nation that can purchase lands for national parks, as has been done several times, can purchase lands for national forests to maintain a permanent timber supply, protect our waterpowers and preserve the public health, whether such forests affect the navigability of navigable rivers or not. It was decided by the Supreme Court in the Gettysburg case that the national government could purchase land for the inculcation of patriotism. This was a broad interpretation, but one which need not cause terror in the heart of any citizen of the United States or admirer of the Constitution. It is distinctly in the line of the maintenance of national dignity and good citizenship.

Not to go back to old purchases of land in the early history of the country which have already been cited, to provide timber for the Navy, there are on record the following purchases of land within recent years which certainly do not come under the interstate commerce clause in any sense: Sully's Hill National Park, North Dakota, was purchased from the Devil's Lake Indians by virtue of an act dated April 27, 1904. Platt National Park was purchased from the Choctaw and Chickasaw Indians by authority of acts dated July 1, 1902, and April 21, 1904. The National Bison Range on the Flathead Indian Reservation was authorized by act dated May 23, 1908. By this act \$30,000 was appropriated to enable the Secretary of the Interior to pay the confederated tribes for the land according to an act dated April 23, 1904. The same act provided ten thousand dollars for fencing the range and putting up buildings. An act dated March 4, 1909, provided \$47,000 for the maintenance of the Montana Bison Range.

If the government can do these things with its money, it is idle to claim that it cannot spend it equally for lands in any of the states of the Union for the important economic purposes connected with forestry as understood in these modern times. The fact is, we strain at gnats and swallow camels in appropriation of money for national purposes, and whenever it suits legislators to oppose a measure which is otherwise meritorious, the cry of unconstitutionality is almost always resorted to. Notwithstanding all the agitation, argument, and education of recent years, we have much to learn as a people in regard to the economic importance and necessity of scientific forestry. This lesson is being rapidly learned, however, and when it is fully understood the resulting enlightenment will lead to a development of our forest policy which will not endanger the Constitution, but will give greater permanence to the nation, strengthen the United States treasury, and infinitely add to our resources as a people in the years to come.

PROFESSOR GLENN'S REPORT

THE comprehensive report of Professor L. C. Glenn on denudation and erosion in the Southern Appalachian region and Monongahela basin, which is briefly reviewed this month, comes most appropriately at this time when the long sought law making possible national action to preserve the forests of this region has been enacted. The report is a mine of information which will now be of the greatest service. Professor Glenn's first-hand knowledge on the subjects treated in the report has not been equaled by any

one, and the authority of his statements has not been successfully challenged. Here we have the expert testimony of a competent geologist, based on a long and patient reconnaissance on the ground, as to the actual soil conditions in these important drainage areas. The report has a direct bearing on the work of salvage and development now to be undertaken by the general government.

THE OWNERSHIP OF TIMBERLANDS

THE first part of the long awaited report of the Commissioner of Corporations on the lumber industry is a document of great interest. The facts which it presents are not new or surprising to those who were at all informed on the subject, although they probably are to the country at large. They show in a striking way the facilities which our public land methods have offered for the development of large, private holdings; that the government, in fact, has been engineering a magnificent get-rich-quick enterprise from which many men have naturally profited. It also points out the possible consequence in the future of development along the same line. This is what really concerns us as a practical problem. What is done cannot be undone. What is to be done is at least partially within our control.

The first deduction, and the only one to which we now wish to call attention, is the unanswerable argument that this large control of our timberlands by a few private holders makes for the maintenance on as large a scale as possible of national forests and of state forests in every state for the security of the people's interest by maintaining healthy conditions in the lumber industry. This is the only practicable check that can be put upon the power of great private owners.

AMERICAN CONSERVATION

THE new magazine announced sometime ago by the National Conservation Association has appeared for the month of February under the title American Conservation. It should be a valuable instrument for the association that publishes it in keeping its public in touch with various phases of the conservation work. We extend to it a cordial welcome and the best wishes of AMERICAN FORESTRY for wisdom to guide its course and power to enforce the great principles for which it stands.



CURRENT LITERATURE

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Denudation and Erosion in the Southern Appalachian Region and the Monongahela Basin. By Leonidas Chalmers Glenn. Department of the Interior, United States Geological Survey. Professional paper 72. Page 137, Washington, Government Printing Office, 1911.

This report, as stated in the introduction, presents "a brief summary of the results of an examination of the Southern Appalachian region during the field seasons of 1904 and 1905, and of the Monongahela Basin in West Virginia and Pennsylvania in 1907, made for the purpose of studying the effect of deforestation and consequent erosion of the steep mountain slopes on geologic, hydrologic and economic conditions, both in the mountain region itself and in the surrounding areas through which the many streams that rise in the high Appalachians flow on their way to the Mississippi, the Gulf or the Atlantic."

It will be seen from this statement how important a bearing this report has upon the subject of the preservation of the Appalachian forests which has been so much before the public and so much a matter of controversy during the last few years. Professor Glenn's method was closely scientific. He traveled from valley to valley through the southern mountains, noting and recording with great exactness hillside and mountainside wash and wear, soil removal by gullyng and soil burial by overwash and stream overflow, the filling of millponds and the wrecking of dams and bridges, and numerous other evils that are attributed by many observers to reckless deforestation and injudicious attempts to cultivate slopes that are not adapted to agriculture. The report is liberally illustrated from photographs that show in the most graphic manner the conditions described. His studies included parts of eight states, Pennsylvania, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Tennessee and Alabama. Professor Glenn holds that the problems studied by him from the standpoint of the geologist must be solved by methods that relate chiefly to forestry and to agriculture. The agricultural problem involves the selection of the areas best suited for agriculture because of fertility and character of soil and moderate slope of surface, and

the study of the ways in which such areas may be handled to prevent their own destruction through erosion, as well as the destruction of other lands and property by the waste material they deposit and the floods they help to generate. Among other facts noted in the course of his study was the interesting one that steep slopes formed of certain rocks can be safely cultivated, while others no steeper, composed of other rocks, were cultivated with disastrous results.

Much of the area examined is not suitable for agricultural land and should not be cleared and forced into agricultural use, because that forcing means destruction both of the area itself and of the lower-lying areas on the same stream. Such misuse means also slower but none the less sure interference with navigation on the more remote parts of the major stream system.

The report describes the physical features of the country examined, discusses the relation of industries to erosion and denudation, taking up in succession agriculture, lumbering, mining, and power development. The nature, effect and remedies of erosion are considered and several pages are given to a discussion of the debated subject of changes in stream regimen. Professor Glenn says that "the forester would protect steep slopes by keeping them clothed with timber, coax back tree growth on denuded areas, keep down forest fires, protect and perpetuate the supply of hard wood, protect the game and fish, and enhance the beauty and charm of the region as a health and pleasure resort, as well as prevent the navigable streams that flow from these mountains from filling up with the sand and silt whose removal is now costing annually large sums of money."

Then follows a study of the details of conditions in the region, prefaced by a description of the method of treatment. This, with a table of streams and the index, occupies the remaining hundred pages of the report.

We shall probably have occasion from time to time to make use of the facts in this report, which is a valuable reference volume and should be near the hand of everyone who is engaged in the study of the problems connected with these mountains. It can be obtained by application to the Director of the Geological Survey.

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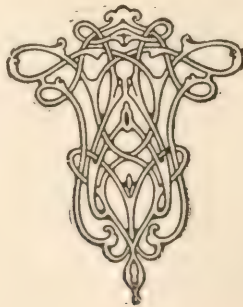
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NATIONAL FOREST WORK

The Resignation of District Forester Chapman

C. S. Chapman, district forester of District 5, United States Forest Service, has resigned from the Service to become secretary of the Oregon Forest Fire Association. He is succeeded as district forester by George H. Cecil, formerly associate district forester. In one sense Mr. Chapman's resignation is a loss to the Forest Service and to the government. In another it is a gain, for he carries into his new field of work the principles and methods of the Service and through him these are really extended over a broader field. It is worthy of note that when these large associations of lumbermen in the Northwest undertake to deal with this problem of fire protection and forestry on a large scale, they select men from the Forest Service to take charge of the work. This is not only a high compliment to the efficiency of the Service and the value of its work, but it is the best possible answer to the criticisms of the Service that are so frequently made by politicians and others in that section of the country. Mr. Chapman entered the Forest Service in 1900 when not over a dozen men were employed in its work. He, therefore, represents all the best traditions which have grown up in the Service.

Grazing Examiners

Examinations, which were held February 23 and 24 for three grazing examiners for the Forest Service, indicate the establishment of a new position in the Service. These positions will pay a salary of twelve hundred dollars a year at entrance. The applicants must be at least twenty years old and possessed of not less than one season's experience in handling range stock, together with one year of technical training in specialized botanical study. Through the work of these examiners it is intended to make every acre of national forest range produce as much forest as it is capable of doing, consistently with the carrying out of the other purposes for which the national forests are maintained. In times past the ranges have been abused by overcrowding. To enable overgrazed areas to recuperate and to prevent the extension of overgrazed conditions in new areas, the amount of stock was everywhere carefully prescribed. The results were then observed and if it appeared that there was still over-use of the range, the numbers were cut down still further. On the other hand,

where recuperation had taken place the allowance of stock was correspondingly increased. Through the appointment of trained botanists and men of practical experience, the best scientific knowledge will be applied to the study of the problems of forage production and utilization in the forests. It is hoped by the introduction of new forage plants to increase the area of range available.

National Forest Fire Losses and Range Use

The final reports by national forest officers of their examination of lands burned over in the forest fires of last summer in Washington and Oregon show that the national forest timber loss in these states is about 700,000,000 feet, somewhat less than was indicated by the estimates made shortly after the fires. Of the forests in these states that on which the fires extended over the greatest area was the Colville, where 160,000 acres were burned. These fires were chiefly surface fires which are far less destructive than fires which travel through the crowns of the trees. It is considered by the forest officers that the fires in this forest show the value, from the standpoint of fire prevention, of proper utilization of the range under regulated grazing. Large parts of this forest and also of the Chelan, Okanogan and other forests are not used by stock because of their inaccessibility. The dry grass and other herbage both spread the flames and made them fiercer and more destructive than they would have been if the land had been grazed. One of the objects of national forest administration is to open all available range to the fullest use consistent with the preservation and protection of forest growth and water supply.

An Eucalyptus Experiment

The rangers of the United States Forest Service, under the direction of F. M. Grant, are to make an experiment in the planting of eucalyptus in the southern California foot-hills. One hundred thousand trees of selected and hardy varieties are to be set out where they cannot be irrigated and will be left to shift for themselves. This is wholly an experiment and represents an effort to put into use large areas of soil that is proven to be fertile by its perennial crop of undergrowth but is useless for any ordinary purposes because of its rough-

ness and inaccessibility. The trial plantings are to be made on about seventy acres in the bottom of little Tujunta canyon, northwest of Sunland, one hundred acres in the foot-hills beyond Del Rosa in San Bernardino County, and about fifty acres in Santa Ana canyon.

The Experimental Wood Pulp Mill

The experimental ground wood pulp mill which the United States Forest Service has been equipping at Wausau, Wisconsin, in cooperation with the American Pulp and Paper Association, has begun to grind. The carrying on of the tests now announced as under way was provided for by a special appropriation, placed at the disposal of the Secretary of Agriculture by Congress last winter, to conduct tests of the suitability for paper making of plants and woods which seem likely to become valuable sources of supply of new material.

Secretary Wilson considered that the best use which could be made of this money would be to conduct experiments on a commercial scale, with various kinds of wood. Some of these have already been studied in the laboratory, and found to be intrinsically suitable for pulp manufacture. Indeed, the Forest Service has actually made paper by one of the chemical processes from several of them. But in order to know whether they can profitably be utilized, under present conditions, it is necessary to test them under methods of manufacture comparable to those employed in actual business operations. In particular, it is desired to find out to what extent new woods can be used for ground pulp, the cost of which is usually less than that of chemical pulp.

The Wausau mill has been built especially for the use of the government as long as the experiments may require. Its inside dimensions are 40 by 100 feet, and it is equipped with electrical machinery and all necessary apparatus of the most up-to-date type. Part of the equipment is contributed by the American Pulp and Paper Association, and part is furnished by the government. The association will also furnish the wood for the tests. The wood now on hand includes carload lots of jack pine, spruce, hemlock, and tamarack. The jack pine is to be the first wood tested.

While the experiments are intended to cover woods from all parts of the country which, from the standpoint of physical properties and available supplies, promise to furnish new material for the paper-making industry, a special point will be made of tests of Western woods which are abundant in the national forests. There are enormous supplies of various softwoods in these forests for which there now exists little demand. In order to have forests produce timber steadily they must be cut; but if there is a market only for timber from the most valuable kinds of trees the result of cutting is likely to be the disappearance of these trees and their replacement in the forest growth by species which are not in demand. Since the pulp mills take material too small for the lumber mills, species suitable for paper making can be cut to a low timber diameter, and thus the balance may be turned in favor of the reproduction of the more valuable kinds of trees.

In addition to the benefit which the public will derive from the advancement of forest conservation in consequence of the wood pulp experiments of the government, there is the further benefit of cheaper paper which it is believed these experiments should make possible.

Boundary Changes

Recent announcements of additions to and eliminations from national forests, are as follows:

FOREST	STATE	Add. Acres	Elim. Acres
Ozark.....	Arkansas.....		563,331
Kern.....	California.....		33,526
Lassen.....	California.....	38,709	6,107
Monterey.....	California.....	7,690	21,527
Boise.....	Idaho.....		9,940
Alams.....	New Mexico.....	245,450	22,333
Sevier.....	Utah.....	93,730	2,560
		385,579	659,324

STATE WORK

The Year's Forest Legislation in Vermont

By A. F. Hawes, State Forester.

The Vermont Legislature of 1910 has on the whole taken a progressive stand in forestry matters, and as indicative of the growing sentiment throughout the State in favor of forestry, this is especially encouraging. The law of 1908 creating the office of state forester, appropriated \$12,000 annually for the departments of agriculture and forestry. By increasing this appropriation to \$20,000 the new legislature virtually stamped its approval upon the forestry work of the first two years. These funds are divided between the two departments by the State Board of Agriculture and Forestry; and the amount allotted to forestry was \$9,000 in 1909; and \$7,500 in 1910. The increasing demands upon the Commissioner of Agriculture will make it impossible for the board to grant as large a proportion of the new appropriation to forestry, but it is hoped that at least \$12,000 will be available, which would allow about \$5,000 for the purchase and planting of demonstration forests in various parts of the state, and in the improvement of the fire warden service made possible another bill passed by this legislature. The strongest supporter of the forestry movement in the legislature was Hon. Allen M. Fletcher of Cavendish, chairman of the Ways and Means Committee and for a long time an active member of the Vermont Forestry Association.

The amendment of the present fire warden law provides that in addition to the first selectman, who is at present fire warden, the state forester has authority to appoint additional wardens in mountainous towns particularly liable to fires; and to pay their expenses to local meetings for the discussion of forest fire topics. It also provides that if any forest owner will establish a lookout station on top of a mountain and connect the same with telephone, that the state will maintain a watchman there during a dry season. An amendment was added in the House compelling any railroad to establish a fire patrol at the request of the state forester in danger seasons, with a penalty of \$25 a day for disobedience. This was killed in the Senate by the Boston and Maine R. R.; and while it would not have worked a hardship on any railroad, it is of little importance since there are comparatively few railroad fires in Vermont.

In its enthusiasm for forestry the General Assembly passed one or two measures, the wisdom of which may be doubted but which illustrate very well the growing interest along this line. Such a measure was the bill reestablishing a bounty on porcupines. The last time this bounty was in force it resulted in an expenditure of several thousand dollars a year of state funds. Now the animals have been allowed to breed unmolested for several years and will be a profitable source of income for many hunters. While it must be admitted that porcupines do considerable damage to growing timber in certain regions, it probably does not compare in money value to that done by woodchucks and house rats, yet there is no state bounty on these animals.

One of the most curious forestry situations has been the growing opposition throughout New England to the Christmas tree industry. From Vermont about 300,000 trees have been shipped annually to Cincinnati, Cleveland, Pittsburg, Washington, and other points west and south. All of these trees could easily be grown in fifteen years on 300 acres, and yet coming as they do from many parts of the state they have attracted undue attention. Lumbermen and pulp men have made the most of it to distract attention from the damage done by them in cutting small trees, and the press has been energetic in its attacks. The result was that a law was passed without opposition requiring a dealer to pay a license of twenty-five cents a tree if he cuts over twenty evergreen trees less than seven inches at the butt on land not his own. As the dealers have been paying little more than a cent apiece this license is intended to be prohibitive. There is apparently no reason why this law would not apply equally to trees cut for pulp or lumber, if they were under seven inches on the stump and cut by a lumberman simply owning the stumpage without the land. It is, of course, regrettable that the farmers have not been able to get more profit out of the Christmas tree industry.

A natural sequence of this law, and one which any lumberman might have foreseen, was a bill introduced by the legislative committee on conservation, providing that on certain sized tracts no spruce or hemlock trees under fourteen inches on the stump should be cut and no hardwoods under ten inches. Of course, no bill of such a nature could pass and it would

probably be proclaimed unconstitutional if passed, but it is regrettable that there is a tendency in such legislation to disregard entirely the experience of other nations which have had centuries of experience in dealing with this problem. No hard and fast rules can be laid down for forestry any more than for farming and any such rules are dictated only by ignorance of the subject.

One of the most interesting situations of the session arose over two bills introduced by the International Paper Company to allow the driving of pulp logs on two streams draining large forest areas owned by them in the mountains. There is, of course, no question but what this lumbering is to be done. The only question from a forestry standpoint is whether the company can be induced to practice forestry. The privilege of driving the logs to the mill would reduce the cost of transportation between \$1.50 and \$2.00 per cord. On a cut of ten cords per acre this would mean a big saving and, of course, a large inducement to the company to invest money in forestry, either planting or leaving seed trees. This company has shown a better disposition to practice forestry than any other concern in the state and offered in this bill to bond itself heavily to cut only under the direction of the state forester. Here was an opportunity of getting forestry practiced on 30,000 acres, but the opposition on the part of various business interests, probably including a railroad interested in the freight of the logs, and of summer residents who feared a disfigurement of the rivers, prevailed. It is to be hoped that the company will not retaliate by slashing their forests, which would probably have a worse effect on the stream; but may practice some forestry measures even without being required to do so.

Governor Proctor appointed four years ago a Conservation Commission of which Hon. Joseph A. DeBoer was the chairman. This Commission took an active part toward the creation of the state forester's office.

A second Conservation Commission was established by the past legislature, the members of which, appointed by Governor Mead, are President John M. Thomas of Middlebury College; Hon. C. P. Smith, Treasurer of the University of Vermont and State Agricultural College; and Colonel F. S. Billings of Woodstock. No appropriation was made for investigative purposes aside from the general funds available for the state geologist; the state forester; and the appropriation for an investigation by the United States Geological Survey of the water powers of the state.

The State Board of Agriculture and Forestry is made up as follows: Gov. John A. Mead, Chairman; Professor Joseph L. Mills, Director of the Experiment Station and Dean of the State Agricultural College, Secretary; and Hon. Clement F. Smith,

Master of the State Grange. Governor Mead has traveled extensively in Palestine and other countries, where he has been impressed with the damage done by deforestation, and is a strong supporter of the state forestry policy.

The annual meeting of the Vermont Forestry Association was held in Burlington February 23. In the afternoon there was a business meeting, a talk on the forestry course in the Agricultural College by Professor J. L. Hills, and a discussion, opened by Austin F. Hawes, state forester, on state control of privately owned timber lands. In the evening there were addresses by Professor J. W. Toumey of the Yale Forest School, and others.

Nebraska

The Nebraska Conservation and State Development Congress held its second annual meeting in Lincoln, February 23rd and 24th. The program embraced a very broad and complete discussion of the state's resources and their development and the work of different agencies looking to that end.

The death of Prof. F. J. Phillips of the University of Nebraska, who committed suicide last month on account of despondency due to illness, is a loss to his profession and his associates. Professor Phillips was a young man who was doing a good work and doing it well.

North Carolina Forestry Association

The North Carolina Forestry Association was organized at Raleigh on the first of February with Dr. D. H. Hill of the North Carolina College of Agriculture and Mechanic Arts, president, and J. S. Holmes, state forester, secretary and treasurer. The association will open a general state campaign for better forest laws and their enforcement. An effort will be made to have instruction in forestry given in the public schools. An interesting program of practical papers on forestry subjects was presented at the meeting.

Northern Forest Protective Association

Thomas B. Wyman, forester of the Cleveland-Cliffs Iron Company, Munising, Michigan, has become chief forester of the new Northern Forest Protective Association, the organization of which has been previously noted in these pages.

To obtain the funds with which to carry out the forest patrol plan, which is a primary feature of the protective work, the directors have voted to levy an assessment of one-half cent an acre on the lands in the association, in addition to which each member pays a membership fee of \$5. As there are now, approximately, 2,000,000

acres of land signed up, the amount available for the coming year's use will be about \$10,000. It is expected that this amount will soon be doubled. The holdings of the present members of the association are fairly contiguous, being located principally in Alger, Marquette, Baraga, Houghton and Ontonagon counties, which makes the patrol much more feasible and less expensive than if the lands were widely scattered.

As fires broke out in March last year, an effort will be made to get things in readiness for actual work as soon as possible. The chief forester will engage a number of assistant foresters and patrols.

Protection from and precautions against forest fires, however, will not be the sole purpose of the association. A campaign of education will be conducted to impress upon the public the value of forest protection and conservation, not only to timber owners, but to the public at large. Homesteaders and campers will be taught to take precautions that will prevent fires, and the necessity of prompt action to quench them when once they get a start. No effort will be made to keep hunters and fishermen off, but the patrols will see to it all trespassers take timely precautions regarding fire and will endeavor to enforce the state laws.

Ohio State Forestry Society

The Ohio State Forestry Society held its seventh annual meeting at Columbus on Friday, February 3. The meeting was held in connection with the fourth annual national corn exposition, which brought together in the Ohio exposition buildings at Columbus noteworthy agricultural exhibits of thirty-five states. The exposition was open from January 30th to February 11th. There were some interesting forestry exhibits from the United States Forest Service, the Ohio Experiment Station at Wooster, and the Ohio State University. The most striking feature of the Forest Service exhibit was the model, first shown in the Appalachian exposition at Knoxville, showing the action of rainfall on wooded and denuded slopes. On one side of the model is a hillside covered with evergreen, and below in the level open country farm lands. On the other side is a bare gravelly hillside. A spraying arrangement with two arms produces rainfall on the two slopes. On our side the water runs off clear in the well-defined banks of a stream to a lake. On the other side the hill is suffering constant erosion, the stream that drains the area is muddy, with shifting bed and banks. Stones and silt are carried down and scattered along the banks and the lake, which furnishes the outlet, is muddy. The whole area is desolate and in striking comparison to that beside it. This model is an absolute reproduction of natural conditions and cannot fail to carry a most impressive lesson.

The state experiment station had an instructive exhibit, illustrating by photographs and by wood sections the conditions existing in Ohio. A great deal of interest was shown in these exhibits and the representatives of the station were kept busy explaining and giving practical talks to visitors throughout the day.

The meeting of the state forestry society Friday afternoon was held in one of the lecture rooms. The program began with an address by the President, Professor William R. Lazenby of Ohio State University, reviewing the work of the association and its problems. Following this Professor Bruce Fink of Miami University reviewed the subject of "Forestry at the Saint Paul meeting," bringing out the salient features of the forestry discussions at the Second Conservation Congress. Assistant Professor C. H. Goetz, who has recently come to Ohio State University from Washington, spoke on "Timber Waste of the Northwest." The speaker attributed the great waste in that section to greed for wealth and to transportation conditions. It is not a voluntary waste but is due to economic causes.

Mrs. Clara Murdock of Akron, representing the Ohio Federation of Women's Clubs, spoke on "Unused Forces," showing the work done by the federated club women along all lines of effort, as an evidence of the great force here latent and ready to be used at need.

An interesting address followed on "County Forestry Societies" by George W. Miller of Bucyrus, president of the young but active Crawford County Forestry Society. County organizations play a considerable part in affairs in Ohio and the State Forestry Society proposes to organize branch societies in each county. Two counties, Crawford and Morrill, are already organized and Mr. Miller presented a very definite and well-conceived program for county work.

Edwin A. Start, executive secretary of the American Forestry Association, who was present, spoke of the work of that organization, its relation to the state work and the desirability of mutual understanding and close cooperation between the two bodies.

There was a general discussion of the work of the association. The following officers were elected: President, William R. Lazenby of Columbus; vice-president, W. J. Green of Wooster; secretary, J. J. Crumley of Wooster; treasurer, H. C. Rogers of Mechanicsburg; these, with George W. Miller of Bucyrus, to constitute an executive committee.

The state forestry work in Ohio has proceeded along lines peculiar to itself. The state was once covered with rich and varied forests, which have been almost entirely removed. Its great agricultural possibilities have been antagonistic to forestry and the forest needs and opportunities of the state have been disregarded or not understood, yet they are great and this is just

coming to be realized. Provision for the state work has been made in connection with the agricultural experiment station, so that this work has been and is entirely educational and experimental. This is well. It is gradually developing a solid groundwork of popular interest and understanding so that when the time is ripe for the development of a forest service and a complete state forest policy, there will be knowledge and popular support to make it effective and to prevent its being drawn into politics. Present indications are that the work that is being done is bearing good fruit.

Forest Fire Losses in California

Figures prepared by State Forester Homans show that during 1910 there were 738 brush, grass and forest fires in California, as against 638 for the same period of 1909. The excess for 1910 does not show an actual increase for the year, but greater efficiency in fire-fighting, asserts Deputy State Forester Hodge. In other words, wardens reported a greater percentage of the fires in 1910 than were reported the year previous.

Fires were of three classes, as follows: Small fires, put out by one man, 172; fires running about ten acres, 25, and fires which gave considerable trouble, 351. The average fire burned over 654 acres of land and

326,000 feet of lumber, worth \$814,000, besides damage to new growth and the watersheds. In other words, the average fire burned more than a section of land and took seventy-four men ten hours to extinguish.

The total number of acres burned over in 1910 was 482,562, against 357,269 in 1909; but again, Deputy Forester Hodge says, this is because the wardens reported more accurately last year than they did the year previous.

August, as in 1909, was the worst month of the year. During August 30 per cent of the fires occurred, and during July, the next worst month, 15 per cent of the fires occurred. It was on August 24th that the disastrous fires in Idaho and Montana were in full flame.

New York

Dr. Charles G. Wagner, superintendent of the Binghamton State Hospital, has just filed with the Forest, Fish and Game Commission an application for 3,000 white pine saplings, and trees of other varieties, making a total of 5,000, for planting on the hospital farm.

Two years ago the hospital got about 5,000 trees and last year about 3,000 more were added, both shipments being chiefly of white pine.

THE LUMBER INDUSTRY

Commissioner Smith's Report on Standing Timber

The first part of the report of investigations of the lumber industry by Herbert Knox Smith, commissioner of corporations, has been submitted to the President, under date of February 13. This part of the report deals with standing timber. It is quite fully summarized in Mr. Smith's letter of submittal to the President. In this letter Mr. Smith says:

The foremost facts shown are:

(1) The concentration of a dominating control of our standing timber in a comparatively few enormous holdings, steadily tending toward a central control of the lumber industry.

(2) Vast speculative purchase and holding of timber land far in advance of any use thereof.

(3) An enormous increase in the value of this diminishing natural resource, with great profits to its owners. This value, by the very nature of standing timber, the holder neither created nor substantially enhances.

These are the underlying facts, of tremendous significance to the public welfare.

They are primarily the results of our public-land policy, long continued. The laws that represent that policy are still largely operative. The past history and present status of our standing timber drive home upon us the imperative necessity of revising our public policy for the future management of all our remaining natural resources. That history is here outlined.

FROM GOVERNMENT TO PRIVATE OWNERSHIP.—Only 40 years ago at least three-fourths of the timber now standing was (it is estimated) publicly owned. Now about four-fifths of it is privately owned. The great bulk of it passed from government to private hands through (a) enormous railroad, canal, and wagon-road grants by the Federal Government; (b) direct government sales in unlimited quantities at \$1.25 an acre; (c) certain public-land laws, great tracts being assembled in spite of the legal requirements for small holdings. Such laws were wholly inappropriate to forest regions; but, though vigorously condemned in several public reports, they are still largely in force. In theory, they were intended to distribute the public lands in small tracts as homes

for freeholders. In fact, they actually furthered timber concentration in vast holdings. The 1,802 largest holders of timber now own 88,579,000 acres of land, as compared with a vastly wider distribution of public lands in non-timbered agricultural sections.

During this interval, and chiefly in the latter half thereof, the value of standing timber has increased tenfold, twentyfold, and even fiftyfold, according to local conditions. The present annual growth is only about one-third of the present annual cut. Replacement by new growth is very slow.

Examples of the increase during this interval are: From \$5 to \$30 an acre, \$7 to \$40, \$20 to \$150, \$1 to \$13, \$4 to \$140, \$1 to \$50. Specific tracts have been sold first for \$24,000, and later for \$153,000; \$10,000, and later \$124,000; \$240,000, and later \$2,500,000; \$23,000, and later \$500,000; \$19,000, and later \$1,125,000. These examples illustrate the remarkable profit made by certain individual holders.

What did the government get for the timber? Of the southern pine sold for \$1.25 an acre, much is now worth \$60 an acre. Large amounts of Douglas fir in western Washington and Oregon, which the government gave away, or sold at \$2.50 an acre, now range from \$100 to \$200 per acre. The great redwood belt in California was alienated on similar terms, and some of it is now worth hundreds of dollars an acre. Practically none of the great forests in the public-land states was sold by the government for more than \$2.50 an acre. The great increase of value gives grave importance to the concentration of ownership.

The former Chief of Field Service of the General Land Office, H. H. Schwartz, stated officially (1909) that the Timber and Stone Act—

"has resulted in the sale of over 12,000,000 acres of valuable timber lands, of which fully 10,000,000 acres were transferred to corporate or individual timber-land investors by the entrymen. These lands brought to the people or general government a gross sum of \$30,000,000. At the date of sale they were reasonably worth \$240,000,000. The profit of over \$200,000,000 went not to the needy settler engaged in subduing the wilderness, but to the wealthy investors. Not over a fractional part of 1 per cent of the timber purchased from the United States under this act is held, consumed, or even cut by the men and women who made the entries."

An effective illustration of what has happened under our land laws appears in the report of the United States Forester for 1910:

"An investigation emphasizes the probability that heavily timbered lands, if opened to entry, would pass into the hands of large owners of timber. Of 705,000 acres eliminated from the Olympic National

Forest in 1900 and 1901 on the ground that the land was chiefly valuable for agriculture and that the settlement of the country was being retarded, 523,720 acres passed ultimately into the hands of owners who are holding it purely as a timber speculation. Three companies and two individuals own over 178,000 acres, in holdings of from 15,000 to over 80,000 acres each. Of timbered homestead claims on this eliminated area, held by 100 settlers, the total area under actual cultivation is only 570 acres, an average of but 5.7 acres to each claim. It will be seen that the original purpose of the elimination was defeated, and the bona fide settlement was not materially advanced."

CONTROL OF THE TIMBER CONTROLS THE WHOLE INDUSTRY.—Whatever power over prices may arise from combinations in manufacture and distribution (as distinguished from timber owning), such power is insignificant and transitory compared to the control of the standing timber itself or a dominating part thereof. The Senate and House resolutions, to which this investigation is responsive, ask for the causes of the high prices of lumber and the effect of combination upon such prices. The resolutions, therefore, required determination of both the amount and the control of standing timber.

AMOUNT OF STANDING TIMBER.—There is now left in continental United States about 2,200 billion board feet of privately owned standing timber, of which 1,747 billion is in the "investigation area," covered in great detail by the Bureau. This area includes the Pacific-Northwest, the Southern Pine Region, and the Lake States, and contains 80 per cent of all the private timber in the country. In addition, there are about 539 billion feet in the national forests and about 90 billion feet on other non-private lands. Thus, the total amount of standing timber in continental United States is about 2,800 billion board feet. The present annual drain upon the supply of saw timber is about 50 billion feet. At this rate the timber now standing, without allowance for growth or decay, would last only about 55 years.

The present commercial value of the privately owned standing timber in the country, not including the value of the land, is estimated (though such an estimate must be very rough) as at least \$6,000,000,000. Ultimately the consuming public will have to pay such prices for lumber as will give this timber a far greater value.

This is the first comprehensive and methodical investigation of the amount and ownership of our standing timber. It rests on the best information obtainable from records of timber owners or the knowledge of men in the industry, information which daily forms the basis of actual business dealings. (A physical canvass of the forests was out of the question.) The data, collected by field work in about 900 coun-

ties, assembled, mapped, checked, and weighed in the office, are reliable within a relatively small margin of error. All figures relate to merchantable saw timber, in terms of lumber yield. The unit "board foot" is a foot square and an inch thick.

CONCENTRATION OF TIMBER OWNERSHIP.—Three vast holdings alone, the greatest in the country, those of the Southern Pacific Company, the Weyerhaeuser Timber Company, and the Northern Pacific Railway Company (including their subsidiary companies), together have 233 billion feet, or nearly 11 per cent of all our privately owned timber. They have 14 per cent of that in the "investigation area." With the five next largest they have over 15 per cent of the total privately owned timber and over 19 per cent of that within the investigation area. Finally, nearly one-half (48 per cent) of the private timber in that area is held by only 195 great holders. The term "holder" covers any single interest—individual, corporate, or group—which is so united as to be under one control.

The Pacific-Northwest.—Five-elevenths of the country's privately owned standing timber is in the Pacific-Northwest (California, Oregon, Washington, Idaho, and Montana), 1,013 billion feet. One-half of this is now owned by 37 holders; many of these are closely connected. The three largest holders (named above) alone have nearly one-quarter. This section now furnishes only one-sixth of the annual cut. Thus its timber is being largely held for the future, and the large owners there will then be the dominating influence in the industry.

The Southern Pacific Company holding is the greatest in the United States—106 billion feet. This is about 6 per cent of the private timber in the investigation area, and 10 per cent of that in the Pacific-Northwest. It is difficult to give an adequate idea of its immensity. It stretches practically 680 miles along that railroad between Portland and Sacramento. The fastest train over this distance takes 31 hours. During all that time the traveler thereon is passing through lands a large proportion of which for 30 miles on each side belongs to the railroad, and in almost the entire strip this corporation is the dominating owner of both timber and land.

The second largest holder is the Weyerhaeuser Timber Company (including its subsidiary companies), with 96 billion feet. This does not include further very extensive timber interests of the Weyerhaeuser family and close associates.

These two holdings would supply the 46,584 sawmills in the country for four and two-thirds years. They have one-eleventh of our total private timber.

The third largest, the Northern Pacific Railway Company, has 36 billion feet.

These three holdings have enough standing timber to build an ordinary 5 or 6 room frame house for each of the 16,000,000 families in the United States in

1900. If sawed into lumber and placed in cars, their timber would load a train about 100,000 miles long.

The holdings of the two railroad companies are government grants, and 80 per cent of the Weyerhaeuser Timber Company holding was bought from the Northern Pacific grant. Many other large holdings (here and in other regions) were mainly purchased from some land grant.

Southern Pine Region.—In the Southern Pine Region there are 634 billion feet of privately owned timber. Concentration in total timber is much less than in the Pacific-Northwest. There is, however, a high concentration in the more valuable species, longleaf yellow pine and cypress. Sixty-seven holders own 39 per cent of the longleaf yellow pine, 29 per cent of the cypress, 19 per cent of the shortleaf and loblolly pine, and 11 per cent of the hardwoods.

The Lake States.—In Minnesota, Wisconsin, and Michigan there are 100 billion feet of privately owned timber. In Wisconsin 96 holders have three-fourths of all the timber. In Michigan 113 holders have 66 per cent. In Minnesota 6 holders have 54 per cent of the very valuable white and Norway pine, 16 per cent of the other conifers, and 2 per cent of the hardwoods. Taking all three states, 215 holders have 65 per cent of all the timber.

EFFECT OF CONCENTRATION.—Such concentration in standing timber, if permitted to continue and increase, makes probable a final central control of the whole lumber industry. A few strong interests, ultimately holding the bulk of the timber, can set the price of timber and its products. The manager of the National Lumber Manufacturers' Association recently said to lumbermen on the Pacific coast:

"The day of cheap lumber is passing and soon will be gone, but the men who make the money will be those who own timber and can hold it until the supply in other parts of the country is gone. Then they can ask and get their own price."

Certain further factors, not exactly measurable, increase still more the real concentration. First, a further interweaving of interests, corporate and personal, connects a great many holdings which the Bureau has treated as separate; second, there are very large totals of timber so scattered in small tracts through larger holdings that they are substantially "blocked in" or "controlled" by the larger holders; third, the concentration is much higher in the more valuable species.

General information obtained indicates a very high concentration in timber ownership outside the investigation area.

POLICY OF GREAT HOLDERS.—The largest holders are cutting little of their timber. They thus reserve to themselves those incalculable profits which are still to accrue with the growth of the country, the diminishing of timber supply, and the further concentration and control thereof. Many of the very men who are protesting against conservation and the national forest system

because of the "tying up" of natural resources are themselves deliberately tying them up far more effectively for private gain.

The fact that mature timber is thus withheld from use is clear evidence that great additional profits are expected to accrue through further increase in value.

LAND MONOPOLY.—Standing timber is not the only question. When the timber has been cut the land remains. There has been created, therefore, not only the framework of an enormous timber monopoly, but also an equally sinister land concentration in extensive sections. This involves also a great wealth in minerals. The Southern Pacific has 4,318,000 acres in northern California and western Oregon, and, with the Union Pacific, which controls it, millions of acres elsewhere. (The government, however, is now suing to annul title to the Southern Pacific lands in Oregon for non-compliance with the terms of the original grants.) The Northern Pacific owns 3,017,000 acres of timber land and millions more of non-timbered land. The Weyerhaeuser Timber Company owns 1,945,000 acres. In Florida, five holders have 4,000,000 acres, and the 187 largest timber holders have over 15,800,000 acres, nearly one-half the land area of the State. In the whole investigation area the 1,802 largest holders of timber have, together, 88,579,000 acres (not including Northern Pacific and Southern Pacific lands in non-timbered regions); which would make an average holding of 49,000 acres, or 77 square miles.

Finally, to timber concentration and to land concentration is added, in our most important timber section, a closely connected railroad domination. The formidable possibilities of this combination in the Pacific-Northwest and elsewhere are of the gravest public importance.

THE FUTURE.—These are the facts of the lumber business in its most important feature, the natural supply. The paramount consideration remains still to be stated. There are many great combinations in other industries whose formation is complete. In the lumber industry, on the other hand, the Bureau finds now in the making a combination caused, fundamentally, by a long-standing public policy. The concentration already existing is sufficiently impressive. Still more impressive are the possibilities for the future. In the last 40 years concentration has so proceeded that 195 holders, many interrelated, now have practically one-half of the privately owned timber in the investigation area (which contains 80 per cent of the whole). This formidable process of concentration, in timber and in land, certainly involves grave future possibilities of impregnable monopolistic conditions, whose far-reaching consequences to society it is now difficult to anticipate fully or to overestimate.

Such are the past history, present status, and apparent future of our timber resources. The underlying cause is our public-land policy, resulting in enormous loss

of wealth to the public and its monopolization by a few interests. It lies before us now as a forcible object lesson for the future management of all the natural resources still remaining in the hands of the government.

Hardwood Manufacturers' Association

The Hardwood Manufacturers' Association held a great meeting at Cincinnati, January 31st and February 1st. The administration of President Carrier has been most successful. In his annual address Mr. Carrier referred to the alarming decrease in the hardwood supply shown by government statistics, verified by the association, as meaning "constantly increasing values of stumpage, with little hope of practical reforestation—a condition the gravity of which must be recognized by every operator."

The report of the secretary, Lewis Doster, gave the amount of lumber shipped in 1910 by members of the association at 659,022,000 feet.

W. B. Townsend presented a report for the committee on forest conservation, in which he said that the subject was many sided, and in the current discussion of it too much ill-feeling and slander had been stirred up to accomplish the maximum of public good at the minimum expense. He alluded to the forests still remaining in Oregon and in the South from Maryland to Texas as refuting the pessimist who is constantly crying "Wolf! wolf! where there is no wolf and, who, with sanctimonious air and grieved expression, claims that with present methods of manufacture—which he calls destruction—we will have no standing timber left in a decade." He took up the question of forest fires and criticised severely the expenditure of its funds under a former chief, claiming that of its \$20,000,000 vast sums had been used to employ and pay lecturers, etc., which should have been used to provide fire protection. In closing, he said: "The costly lessons of this year I trust will result in substituting practical for theoretical methods—for it surely has been demonstrated that lectures, editorial, or news articles cannot stop the ravages of a forest fire. I am glad to note a change along these lines, and I believe we may expect very material improvements from the present administration of this important department of our government." A vote was taken endorsing the sentiments expressed by Mr. Townsend.

In his comments on the pessimist, Mr. Townsend seems to have hit President Carrier, for the latter's statement in his annual address regarding the hardwood supply certainly challenged Mr. Townsend's confidence in our security. In regard to his criticisms of expenditure by the Forest Service Mr. Townsend seems to have got his inspiration from the article by Senator Carter of Montana, which was given so much publicity last autumn. The

carelessness and injustice of this article were clearly shown in an editorial in *AMERICAN FORESTRY* for December, 1910. We do not care to traverse the ground now, but in view of the fact that Senator Carter's article has evidently been taken seriously in a quarter that should have been better informed, we call attention to two facts—the restriction put by Congress upon the manner of expending the appropriations, and the comparatively insignificant amount which was really expended for lectures, and for the necessary educational work done by the department. It will be worth while for members of the Hardwood Manufacturers' Association to read the article referred to in connection with Mr. Townsend's report. It is on page 735 of this magazine for December, 1910.

A resolution adopted by the association approved and promised support to the Forest Products Laboratory at Madison, Wisconsin, called the attention of the University of Wisconsin to its great opportunity for establishing a school of forest utilization, and urged upon Congress the need of developing more highly the work of this branch of the Forest Service to enable it "to take up at once the many vital problems now confronting the lumberman, the solution of which will result in such great benefit to the whole nation." Another resolution opposed the reciprocity agreement with Canada on the ground that it singles out for reduction of tariff the products of the soil, both forest and agricultural.

The officers and executive board elected are: President, W. B. Townsend; vice-presidents, W. E. Delaney and C. E. Ritter; treasurer, C. M. Crawford; R. M. Carrier, Clinton Crane, W. A. Gilchrist, F. F. Fee, J. H. Himmelberger, C. H. Lamb, John W. Love, G. M. W. Buehrmann, J. W. Oakford, A. B. Ransom, W. M. Ritter, R. H. Vansant, William Wilms. There were also chosen an executive grading commission of fourteen, twenty-one state vice-presidents, and state directors for seventeen states. The attendance was 368, the largest in the ten years' history of the association.

Northern Hemlock and Hardwood Manufacturers

The Northern Hemlock and Hardwood Manufacturers' Association held its second annual meeting in Milwaukee, January 31. Among other subjects in his annual report, the secretary, R. S. Kellogg, discussed the need of more complete utilization of product, declaring that there are possibilities yet undreamed of in all kinds of timber. Referring to the work already done by the United States Forest Service and the University of Wisconsin, he asked why the state of Wisconsin should not be requested to provide at the university a school of forest utilization, where men can be technically trained in the manufacture of forest products. On this point he said: "The laboratory studies, investigates, invents and discovers. The school teaches men how to

apply scientific principles to the problems of production. Wisconsin has no need for a school in which to train foresters: there are plenty of such schools already in existence, from the Atlantic to the Pacific. They should be strengthened and made more efficient, not weakened, through the multiplication of small schools. But there is no college or university in Wisconsin or in any other state to which we can send a man for thorough instruction in the manufacture of forest products. The forestry schools teach us how to grow timber. Is it any less important that we should be taught how to utilize it? It is likely that the present session of the legislature will be asked to establish a forest school at the university. Should we not grasp the opportunity before it is too late to secure instead the school that is by far the most needed, a school of forest utilization? Would it not be well for us to have our legislative committee present this view to the governor, the legislature and the university, and for us to ask other state organizations to join us in our efforts to make the most of our timber resources?"

Thornton A. Green reported for the forest fire committee, reviewing the work of the Lake States Forest Fire Conference and the formation of the Northern Forest Protective Association.

William L. Hall, chief of the division of products of the United States Forest Service, made a comparison between the increase in population and the increase in lumber production which was enlightening. He said: "In 1880 the lumber production was 18,000,000,000 feet. In 1890 the increase was 31.5 per cent. In the decade from 1890 to 1900 the increase was 47 per cent, and between 1900 and 1910 the increase was 27 per cent, representing a production of 44,484,000,000 feet. The total gain in these thirty years was 146 per cent. The population of the country in 1880 was 50,000,000; in 1890 it was 62,000,000, representing a growth of 25.5 per cent, and in 1900 it was 76,000,000, showing a growth of 21 per cent; and in 1910 it was 92,000,000, showing an increase of 21 per cent. The total increase in population for the thirty years has been 83 per cent, as against 146 per cent for the increase in lumber production.

Sawmill capacity apparently has also increased to a large extent. We do not know how much the capacity of the mills exceeded actual production in previous decades. Taking the figures for 1909, I have studied this subject with reference to two states, Louisiana and Washington. In Louisiana 383 mills out of a total of 658 reported their capacity as well as their actual production. In that state actual production amounts to only 62 per cent of the rated capacity of the mills. In the state of Washington the actual production was somewhat lower, amounting to 51 per cent of the capacity of the mills. With such a margin of capacity over actual production it is easy to see how strong is the tendency toward increase of production.

The plants are upon the ground, the operations are all laid out. It is perhaps just as easy to produce 75 percent of the nominal capacity of the mills as it is to produce 50 percent. Of course, the industry, on this account, will respond to every improvement in market conditions with an unnecessarily large increase in production unless there be a sufficiently strong control of production to prevent it, and that control the figures clearly show to be lacking."

Officers elected were: President, W. C. Landon; vice-president, M. P. McCullough; treasurer, George E. Foster; secretary, R. S. Kellogg; directors, W. O. Brightman, George H. Atwood, T. A. Green, and R. E. McLean.

Pennsylvania Lumbermen's Association

At the nineteenth annual meeting of the Pennsylvania Lumbermen's Association in Philadelphia, Thursday, January 26, the association's forestry committee reported, through its chairman, J. S. Hess, as follows:

The crusade for the conservation of our natural resources received a strong impetus during the administration of President Roosevelt. The necessity for the conservation of the forests of the United States for the proper use of them by the present and future generations of American citizens was brought to the attention of the whole country. No class of people more faithfully seconded the movement than the lumbermen of the United States. At all meetings of lumbermen during the last decade the subject received their earnest attention, but agitation without action that will tell is of no avail.

As Pennsylvanians we may well be proud of what our state is doing in the direction of conservation and reforestation. Nearly 1,000,000 acres are now in the possession of the state and no forestry department of any state has done more effectual and systematic work than our own great commonwealth. The forestry department has quietly gone forward with the work so nobly begun by Professor Rothrock, and so ably continued by the men at the head of the department today. New forest reserves are being added as the means afford, and men are at work sowing seeds and preparing seedlings for the replanting of the state forest reserves and the private forest lands in the state. Our state is engaged in the education of young men for the work of forestry and the management not only of our state reserves but also of the forest land owned by private individuals.

From an article in the Public Ledger I gleaned the following:

"Although the scientists of the federal and of some state governments have long recognized the growing danger in the rapid spread of the chestnut blight, Pennsylvania

is the only state which has organized a thoroughly systematic study of the disease and applied practical methods to check its spread."

Seeing what the forestry department is doing with the small amount of money appropriated, our association should join with the friends of forest conservation in urging larger appropriations by the legislature to further and continue the great work so nobly done with the limited means at their command.

The national government has been spending a large amount of money in the maintenance of national forest reserves in the West. An equal amount should most justly be spent in the acquisition and maintenance of similar national forest reserves in the South and East. The national reserves in the West amount to 194,505,325 acres. They are cared for by 1,500 national forest officers. The total expenditure during the last year was \$3,908,249. They yield a revenue, but as the larger proportion goes to the states in which they lie the actual expense of maintenance is paid for by the whole country. The states in which the national forest reserves are situated are Arizona, Arkansas, Oklahoma, Colorado, Florida, Idaho, Kansas, Minnesota, Michigan, Montana, Nebraska, Nevada, New Mexico, North Dakota, California, Oregon, South Dakota, Utah, Washington and Wyoming. Not one of the original thirteen states, not one of the states that fought the war of 1812, not one of the states that assisted in the purchase of Florida or the Louisiana country, not one of the states with the exception of Florida that fought the Mexican war ever received a dollar for the conservation of forest lands from the national treasury.

The extensive forest reserves in the West were taken out of the national domain and paid for by the whole country. Common justice would dictate that the South and East should also be taken care of. The West is seeking further expenditure on the part of the national government for the irrigation of her arid lands. If the national treasury should provide for the conservation of the forests of the West, then also should the national government assist in the establishment of national forest reserves in the Appalachian range in the eastern part of the United States.

We lumbermen and other citizens of the East should join in this appeal for simple justice and equity. The two things needed then are: 1. An appeal to the legislature for further appropriations to the state forestry department for the efficient prosecution of the work so well begun. 2. An appeal to the Congress of the United States for our Appalachian forest reserve.

The officers were reelected: President, Henry Palmer of Langhorne; vice-president, F. S. Pyfer of Lancaster; treasurer, T. J. Snowden of Scranton; secretary, J. Frederick Martin of Philadelphia.

Adopted by the Cornell Forestry School

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Roosevelt



PLANTATION OF NORWAY SPRUCE IN VERMONT, THIRTY-TWO YEARS OLD.

American Forestry

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STATE OWNERSHIP OF FORESTS

By AUSTIN F. HAWES,

STATE FORESTER OF VERMONT.

(This survey of a most important branch of state forest policy was originally read at the annual meeting of the Society for the Protection of New Hampshire Forests in 1910. The author has been state forester of Connecticut, as well as of Vermont, and is thoroughly conversant with this question from the standpoint of eastern conditions. We have moved very slowly in the acquisition of state forests, but we must address ourselves to that side of forestry development in all the states, as Pennsylvania has notably done. The great forestry trilogy at present is fire protection, taxation, and state forests.—*Editor.*)

TWO periods in the history of the lands of this country will probably be recognized by future historians. First, the period when disposal of public lands was the only policy of state and nation; and, second, the period upon which we are now entering, distinguished by the policy of reservation or acquisition by state and nation.

The original states of the union upon the birth of the nation found themselves rich in lands with only a scant population to utilize them. It was natural that public debts, such as those due to soldiers, should be paid in land grants, that public bequests, as those founding Dartmouth, Bowdoin and the University of Vermont, should be in the form of land grants; and that the federal government should follow the policy of granting lands as a bonus to railroads building in pioneer regions.

Massachusetts, with its great domain of wild lands in what became Maine, disposed of great areas by lottery. By the Civil War most, if not all, of the lands in New England had been disposed of to private owners. In other parts of the country a similar course was followed, and the United States has now disposed of practically all of its agricultural lands.

Shortly after the centennial and the census of 1880, which first touched upon the forest resources of the country, there began to be an interest among far-sighted men in the preservation of the forests. As the best measure toward this end the bill was passed by Congress making national forests possible. This marked the beginning of the period of reservation and acquisition—a movement which has resulted in the creation of national forests amounting to nearly two hundred million acres and which has recently been broadened out to include other natural resources. It is naturally easier to secure from a legislative body the reservation for special purposes of lands already belonging to the public than the purchase of such lands. This is the

main reason that Congress has thus far neglected to provide a few million dollars for national forests in the east, while the government has been reserving hundreds of millions of dollars worth of land in the west for that purpose. While it is probable that this winter provision will be made for such national forests in the east, it is doubtful whether these will ever be on a scale of great importance to our states. Probably national forests in the east will always be intimately connected with the question of interstate commerce and the protection of the headwaters of navigable streams.

Fortunately, with the movement for the reservation of lands in the west by the government has grown up the idea of state ownership of forest lands through purchase. New York and Pennsylvania have now acquired immense areas partly for the purpose of water protection, partly for the preservation of the beautiful wild scenery and partly for the production of timber. Other states have started in a less ambitious way the same policy and it is already evident that the most striking feature of forestry development of the present century in the east, is to be the acquisition of large tracts by the various states, as reservation by the government has already been in the west. It seems to me that these state forests will fall into several different classes according to the reasons for founding them and the method of management which the purpose of their existence would dictate.

EDUCATIONAL OR DEMONSTRATION FORESTS

The first of these classes in importance for us in New England is the educational or demonstration forest. With the exception of northern Maine and certain mountainous regions of New Hampshire and Vermont, our forests are more or less cut up by agricultural lands and roads. We have easy transportation, either by water or rail, to the best markets of the country, which gives our stumpage a value exceeding that in any other region. We have valuable and rapid growing trees, such as the white pine, spruce, chestnut, etc. In fact, our natural forest conditions resemble more closely those of Europe than any other part of the country, and private forestry development can, therefore, be counted on if demonstrations of forestry operations are available such as state forests would furnish.

These demonstration forests need not be large but should represent one or two important types of land of the vicinity. Every such tract should contain some waste land suitable for planting as private owners can more easily be interested in planting than in any other branch of forestry. The experimental element may well be combined with the demonstration. Different species can be planted on different classes of soil. Mixtures and pure planting and various distances apart may be tried and thus a great deal of valuable data secured in a few years.

A local demand for forest seedlings can often be built up by the maintenance of a small nursery on the tract. But planting should by no means be the only line of work carried on. The demonstration forest should have a few hundred acres of woodland in which thinnings and improved methods of cuttings can be practiced so that land owners will see the various phases of forestry. Thinnings of different degrees can be practiced; the various silvical methods, such as the selection system, stand method, group and strip systems, can be developed so that in a few years the relative results will be apparent. Of course accurate accounts must be kept which can be published in bulletin form from time to time. In all these ways a tract of five hundred acres may serve as well as a larger one. It does not matter particularly whether it is immediately self supporting or not as it is primarily an educational establishment and not a money making scheme, but the sooner it becomes self supporting the sooner will it win the respect of the New England farmer and

lumberman. On some such tracts it will be advisable to give short courses in forestry dealing only with such lines of work as would be of use to the farmer. I can speak from personal experience of the efficiency of one such forest of 300 acres in Connecticut. In 1905 I purchased this tract in a portion of the state where forestry was scoffed at by everyone, and in 1906 started planting. In less than two years three thousand acres of private forests in the same township were under forest management and a nursery with a capacity of 100,000 trees was kept busy catering to the local demand. The sentiment of the whole county has been changed by this small beginning. We have at present two such state forests in Vermont, one of 450 acres in Plainfield near the center of the state, purchased at an average price of \$4 an acre, and one of 350 acres given by Mr. Charles Downer, who has long been interested in forestry.

Not the smallest mission of these demonstration forests above described, is to educate the legislators so that they will forward laws in favor of forestry.

TIMBER RAISING AND REVENUE PRODUCING FORESTS

The kind of state forests advocated above are chiefly valuable indirectly for the influence that they have upon the people who will be led to practice forestry and pass favorable legislation. They will not be on a sufficiently large scale to bring in a revenue of any material value to the state except for supporting the forestry branch of the state government. European states have proved that forests can be maintained more profitably under state and communal ownership and the large areas thus owned pay a considerable share of the current expenses of the various governments.

Thus Saxony, which has very extensive state forests, derives an annual net income of \$5.25 per acre from them. The Saxon forests are largely of spruce and pine and are chiefly managed under the method of clearing and planting, as distinct from the natural reproduction methods in use in Baden and the coniferous forests of France.

Prussia, as the largest German state, is interesting, especially from the fact that it is still purchasing waste lands for reforestation. The net income from its 7,300,000 acres increased from \$1.53 to \$2 per acre between 1900 and 1908; *i. e.*, net income of \$14,600,000.

Wurtemberg and Baden are the two German states which produce the highest net results from their state forests. In Baden eighteen per cent of the state's wooded area or about 235,000 acres belongs to the state, and much of the remaining forest is under state supervision. The annual cut in the timber forest is now equivalent to about 500 board feet per acre. The revenues from these state forests come not only from the sale of wood but from hunting licenses, the sale of grass, berries and other products, while the expenses are for planting, road building, salaries, etc. In 1902 the net income from these forests was \$5.08 an acre.

In Austria the state owns seven per cent of the total forested area and between 1874 and 1903 the net income from this 1,800,000 acres rose from \$525,000 to \$890,000. During this period over 85,000 acres were reforested.

Of the 6,464,000 acres in Bavaria the state owns about one-third. The total gross income from the 2,315,000 acres was \$10,387,000, the expenditures, \$4,593,000, leaving a net revenue of \$5,894,000 or \$2.54 per acre. Although there were 79 forest fires in 1905 not more than 240 acres were burned.

Similar figures might be given for the various other states of Europe showing that state ownership of forests not only pays, but that the revenue from these forests is steadily increasing, due to the ever improved condition of the forest. For the most part these forests have been crown or common lands since earliest history, but during the past century the areas have been considerably augmented by purchase.

In launching our New England states on a policy of state forests for timber raising and revenue, we are confronted from the first with the problem of purchasing the lands. In this connection it should be said that land in this section will probably never be as cheap again as it has been during recent years. In many sections the demand for this class of land is already improving and the price beginning to rise. On this account the sooner these lands are acquired the less the initial investment will be. The natural result of any extensive purchases on the part of the state will be to raise land values in the region. It will, therefore, be advisable from the standpoint of economy, to secure large areas gradually as money affords in a few localities, rather than to scatter small purchases all over the state, thereby raising values everywhere. Of course this raising of values is in itself a benefit to the state speaking in a broader sense. The individual owners are enriched, the assessable property of a town is increased, and the rate of taxation lowered.

What would be the probable investment for the state for the purchase of 100,000 acres, say, in New Hampshire or Vermont? This brings up a question of policy. Shall the state buy the cheapest land available or aim to get the best possible investment just as a private individual would? At first thought it might seem the state's duty to acquire cut over and burned over land of which there is such a great area in every state. It is a peculiar fact that the price at which most of this worthless land is held is usually from \$1 to \$4 an acre, while land of real value worth ten times as much can be purchased for \$4 to \$6 an acre. It is, therefore, a much better investment for the state as well as for the private purchaser to acquire this land covered with pine or spruce reproduction at these prices or sometimes even at \$10 an acre, than to buy mountain tops from which the soil has been burned with the forest. Experience has convinced me that the committees of a legislature will be much more apt to approve this kind of an investment which appeals to the members personally than a purely altruistic proposition such as the acquiring of slash and burns.

There are in all of our New England states considerable areas of good timber still standing. In my opinion some of this class of land should be included, in the first place, because the people expect that the old forests are to be saved and will not be satisfied unless some scenic points are preserved; and, secondly, because by this means an income in the near future will be assured which will appeal to the business sense of the legislators and people. So in the purchase of 100,000 acres there should be a variety of classes of land divided something as follows:

50,000 acres waste land at \$2.00 per acre.....	\$100,000
30,000 acres, second growth, at \$5.00 per acre.....	150,000
10,000 acres timberland at \$10.00 per acre.....	100,000
10,000 acres good timber at \$15.00.....	150,000

Total.....\$500,000

Something the same proportion would hold for larger purchases, *i. e.*, an average price for purchases made during the next decade of \$5 an acre. Of course, in order to get lands at these figures, local agents would be employed and considerable diplomacy required in order not to inflate prices.

Two or three suggestions can be made for raising the funds to finance such a policy during a decade. The first and simplest is, of course, to appropriate from money in the state treasury \$50,000 a year for the ten years. This is probably out of the question for either Vermont or New Hampshire at present, but then the results may be gradually accomplished by smaller appropriations. Another suggestion is a bond issue maturing in forty or fifty years when the forests become productive; and still another is to levy a special tax.

This might be a light income tax which falling only on private persons or corporations with incomes exceeding \$5,000 would not be opposed by the mass of the people; or a small tax of, say 2 cents per thousand feet on all lumber manufactured. A tax of this nature applied only to concerns sawing half a million feet or over would not be heavy (\$10 on 500,000 feet), and, as it is primarily for the ultimate benefit of lumbermen, should not be opposed by them. Many lumbermen would thereby be able to dispose of cut over lands which are now only a source of taxes. To be sure a tax of this amount would hardly afford \$50,000 either in Vermont or New Hampshire, but it might supplement what the legislature was willing to spend from other sources.

It must be remembered that all this expenditure is in the form of an investment for the state; one which should bear good interest—it is safe to estimate from four per cent to six per cent.

The question in the management of these state tracts will come up as to whether it is best to manage them for the greatest possible profit (which would dictate a short rotation) or whether other features should be given importance. In my opinion a part of the area at least should be devoted to raising large dimension timber, such as those required for large telegraph poles, derrick sticks, bridge timbers, etc. This would require a longer rotation, probably 100-150 years, but the industries of the state would be greatly benefited by being able to rely upon a permanent supply of such materials. For similar reasons some slow growing trees, such as hickory and white oak should be fostered by the state in regions where they are adapted, even though they cannot be recommended for private planting.

PROTECTIVE FORESTS

In the above I have discussed state forests for educational purposes, for raising of timber and have not touched upon the protective use of forests. I believe this latter side is over emphasized and that forests are principally valuable for the raising of timber and the support of the industries dependent on them. Of course it is hardly possible to acquire 100,000 acres of forest anywhere in New England without its having a material effect upon the springs and brooks of the region. How much this would affect any large river is probably simply a question of the proportion of the forest area to the entire watershed of the river.

So, too, these forests acquired for these other reasons must add greatly to the beauty of the country and tend to make it a popular resort.

There are, however, in every state certain areas which should be acquired for protective purposes even if not from the standpoint of revenue. All steep mountain slopes in danger of being denuded should be owned by the state as clear cutting on such sites is disastrous to the soil and water supply held by it. So, too, there are areas of shifting sand which should be checked by forest planting that would not be profitable and is, therefore, a proper state duty.

In regions like northern New England and New York where scenery is such an important feature, many particularly beautiful forests should be saved from destruction by state acquisition. This is not sentiment on the part of the state but simply a matter of good far sighted policy.

In all these lines for which we have advocated state forests, it is to be noted that while the state will surely benefit from such a policy, the communities in which the forests are located will benefit still more. Many men will be employed in road building, forest planting, cutting and hauling and a population maintained larger than is at present found in many of these back regions. Local industries long since dead will be revived and maintained on a permanent supply of lumber not again to be abandoned as when forests

have been depleted in the past. All this prosperity in regions now nearly abandoned means happier homes and better citizens. This local effect reminds me of the advisability in some cases of establishing town forests like the communal forests of Europe which are of such great assistance to the small villages and the peasants who live in them. What could be a finer monument for a wealthy man to leave to his native town than a forest tract of five thousand acres to be managed under state control, the income to be used for town purposes?

WOODNOTES

II.

As sunbeams stream through liberal space,
And nothing jostle or displace,
So waved the pine-tree through my thought,
And fanned the dreams it never brought.

"Whether is better, the gift or the donor?
Come to me,"

Quoth the pine-tree,

"I am the giver of honor.

My garden is in the cloven rock,

And my manure the snow;

And drifting sand-heaps feed my stock,

In summer's scorching glow.

He is great who can live by me.

The rough and bearded forester

Is better than the lord;

God fills the scrip and canister,

Sin piles the loaded board.

The lord is the peasant that was,

The peasant the lord that shall be;

The lord is hay, the peasant grass,

One dry, and one the living tree.

Who liveth by the ragged pine

Founded a heroic line;

Who liveth in the palace hall

Waneth fast and spendeth all.

He goes to my savage haunts,

With his chariot and his care;

My twilight realm he disenchants,

And finds his prison there.

—*Ralph Waldo Emerson.*

SOME NEW IDEAS IN CONTROLLING FOREST FIRES

By SAMUEL J. RECORD

WHEN Daniel W. Adams last July became supervisor of the Arkansas National Forest the principal problem confronting him was that of protecting the forest from fire. The previous fire season had been particularly disastrous, due largely to incendiarism. The enforcement of laws pertaining to the disposal of the public lands and timber made many enemies for the Forest Service. It seems typical of a lawless mountaineer never to fight in the open and true to their instincts the enemies of the service fought from ambush. They burned the woods, they slashed and tore the posters and notices, they destroyed telephone lines, all with wanton disregard for the welfare of their law-abiding neighbors. The majority of the people in and near the national forests of Arkansas are opposed to forest fires and to all forms of lawlessness, but have hesitated to openly oppose such acts for fear of a criminal few. The unfortunate forest agitation at Washington was directly responsible for two-thirds of the fire damage on the Arkansas forests last season. The enemies of the service encouraged and incited by baseless charges and distorted rumors went to excesses that proved their own undoing.

When Mr. Adams assumed charge his main efforts were directed to a solution of the fire problem. First attention was devoted to organizing the better class of forest users in a fire protective association. In union these people have found the moral strength to oppose the lawless element and thus make woods burning unpopular. The dues of the association are devoted largely to establishing a fund to provide rewards for information leading to conviction of incendiaries. The value of the organization in reducing the fire danger through enlightened public sentiment has been fully demonstrated and will increase with growing membership. A disastrous fire season has taught the farmers an expensive lesson, that the incendiary menaces not only the forest but their property, their homes, their very lives as well.

Favorable public sentiment is essential but not in itself sufficient to eliminate the fire danger. Even under the best conditions fires will occur through accident or lightning or other uncontrollable source. Adequate protection requires (1) means of prompt discovery and location of fires; (2) ready access by trails and roads to all parts of the forest; (3) efficient means of fire fighting. Supervisor Adams, with years of practical training and with no small inventive genius, has been concentrating his attention on improvement of requirements (1) and (3). For months he has worked unceasingly, but good results are rewarding his industry and application. He has prepared a report describing his equipment, apparatus and protective devices. While some of his ideas may, at first blush, appear rather fanciful, they mark the most advanced step in the application of science to forest fire control.

Mr. Frank Rush, of the Wichita National Forest, has demonstrated the importance of water in fighting the hot prairie fires of his locality. He hauls the water in a tank to the scene of a fire and applies it by means of large sprinkling pots. In the mountains and rough forest lands water could not be hauled on a wagon, and there is usually a scarcity of water in the vicinity of

a fire making carrying by hand impracticable. A pack saddle device carrying two tanks of fifteen gallons capacity each and connected under a horse by hose attachments was tried out in the Ozark Mountains. The water was drawn from the tanks to knapsack sprinklers that fit over a man's shoulders.

From this device was evolved an arrangement for throwing the water direct from the saddle to the fire. This was first accomplished by means of a small air pump capable of a pressure of 25 pounds, later abandoned in favor of iron cylinders in which the air has been compressed to 2,400 pounds per square inch. This high pressure is reduced, by means of a simple valve, to a working pressure of from 10 to 25 pounds, and one cylinder is capable of exhausting the 30-gallon tanks 25 times with one charging. The entire apparatus is quite simple, the cost very reasonable, and the expense of operation almost nothing.

Mr. Adams' fire fighters look like warriors of old, for each carries a shield to protect him from the radiation and allow him to work close enough to put the water on the fire rather than on the flames. These shields are made of 20-gauge tin with asbestos cloth cover, and with a spiral wire hand-hold. A three by four-inch mica window is inserted near the top. The whole weighs two and a half pounds, costs only a trifle, and is in detachable sections which may be conveniently carried under the saddle stirrup leathers.

In the course of experiments it was early demonstrated that water in sufficient quantities was too hard to get and when used alone did not have the extinguishing qualities of certain chemicals, especially when used on very hot fires. No chemical apparatus on the market, however, had provision for refilling except by hand. Their use was further hampered by the fragile devices for mixing the acids and other chemicals. Mr. Adams overcame these objections and has applied for patent for a self-charging chemical equipment for shoulder support and an automatic charging equipment for pack saddle support. In this connection it may be interesting to note that the claims made by various chemical engine manufacturers that their engines throw a gas charged water whose fire quenching efficiency is forty to one over ordinary water, seems erroneous in that the water delivered by such apparatus is taken from below the gas line and not charged with gas at all.

Necessity for economizing the supply of water and using more of the flame stifling gas, either alone or in mixture with water, led to the invention of a valve and double hose arrangement whereby pure gas, pure water, or a mixture in any desired proportion can be obtained. By addition from time to time of small amounts of alkaline solution and sulphuric acid the entire charge can be re-energized with great economy of water.

But improvements did not stop there. To obtain a more intimate mixture of gas and water a special nozzle was perfected, which gave a rotary motion so great that the charge comes finely atomized to virtually a gaseous vapor. This should have especial merit in combatting fiercely burning fires.

To make the apparatus practicable on a large scale, several horses may be used in tandem. The leader carries the chemical engine while the rear horses tote the supply tanks containing the sodium solution. The tanks are connected by a common delivery hose coupled by lever valves similar to air hose couplings on cars. Such apparatus is designed for controlling the lee of back fires in dangerous places and fighting other fires in a high wind.

This idea of using several horses in tandem is an adaptation of the old principle of the "packer's hitch." In the mountainous mining regions it is customary to pack ore out and machinery in on mules or burros so hitched that the head of one is close to the tail of the next, making what is known as the "packer's head-and-tail hitch." In this manner the "jack whacker," as the man in charge is called, can lead fifty or more animals, and where the leader



USING EXTINGUISHER AND FIRE SHIELD



IDEAS IN FIRE CONTROL

OLD METHOD OF BEATING OUT FIRES



FIGHTING A SURFACE FIRE WITH
A KNAPSACK SPRINKLER AND
FIRE SHIELD



IDEAS IN FIRE CONTROL

CHEMICAL ENGINE ON HORSE
MR. ADAMS IN BUGGY



TESTING CHEMICAL ENGINE ON A
BURNING TREE SNAG. THE IN-
VENTOR, MR. ADAMS, IN FORE-
GROUND



FOREST OFFICER SIGNAL-
LING TWENTY MILES BY
HELIOGRAPH FROM RANGE
FINDER STATION. NIGHT
SIGNALS ARE MADE BY
POWERFUL ACETYLENE
LIGHTS WITH REFLECTOR



PACK SADDLE OUTFIT
READY FOR QUICK
MOUNTING ON
HORSE

IDEAS IN FIRE CONTROL

goes the pack must necessarily follow, since the animals are hitched so close in that they have no room to get behind trees or other obstructions.

An organized force of fire fighters and proper apparatus are not in themselves sufficient for adequate fire protection. For them to do effective work a fire must be located as soon as possible and there must be means of getting to it promptly. On the Arkansas National Forest fires are now located by means of range finding towers set on prominent peaks overlooking as much country as possible. The towers are connected by telephone with each other, and also with ranger stations and towns in some instances so that when a watchman sights a fire he can give warning or summon assistance.

The upper part of the watchman's tower is a sighting hood with a four-foot opening extending entirely around. In this opening are set, with mathematical exactness, 144 wires, each space corresponding to $2^{\circ} 30'$ of a circle whose exact center is marked by a plumb bob. When a fire is seen the watchman sights by the plumb bob to the wire in line, notes its number; then by telephone or signal exchanges this number with the corresponding number of another tower from which the fire is visible. A map with all the lines plotted is before him so that with any two numbers a fire may be definitely located. A hurried plan of action can be telephoned or signalled, since the map shows the roads, creeks, and fire lines. In planning to handle a fire, the velocity and prevailing direction of the wind, which are noted on a dial over the watchman's chair, are taken into account. Forest rangers, fire guards, and special employees without telephone facilities are notified by heliographic flashes by day and signal lanterns at night. This range finder is extremely simple in operation, designed especially for use by unskilled laborers, thus obviating the necessity for men skilled in the use of instruments who would command much higher salaries.

Supervisor Adams is of the opinion that the national forests could be better protected if the Forest Service had a special fire department separate from the general administration. He proposes "that a fire department of the Forest Service be organized, which should, with one notable exception, bear the same reaction to the service that the fire department of a city bears to the city government. The exception noted is that the members of the forest fire force should devote their extra time to designing and experimenting with equipment and apparatus, in field studies of local problems, and in laying out trails and fire lines. Supplementing this nucleus would be the regular forest officers, the rangers and guards, who would correspond to a volunteer force when the fire occurred."

Such reorganization of the Forest Service would largely relieve the technical men of that most unpleasant of all work, fire duty, leaving to them the solution of forestry problems for which they have specially trained. The men of the forest fire force, being freed from the multitudinous cares of administration, could devote their whole time to a study of fire problems and to effecting their solution. When one realizes that fire is the greatest of all impediments to forest conservation and the practice of forestry everywhere the importance of securing protection becomes obvious. Too much attention could hardly be given to the subject and no plans for the lessening of the danger should be denied a hearing and perhaps a trial. Whether or not Mr. Adams' plans prove successful he is at least entitled to credit for doing some original thinking.

THE PRUNING OF WHITE PINE

By F. B. KNAPP

DIRECTOR OF THE ERIC FOREST SCHOOL

THERE is a widespread theory among both American and German foresters that live branches must not be cut from evergreens. As the result of experiments by Mr. Nathaniel Morton, of Plymouth, Massachusetts, begun in 1891 and later investigations by the Eric Forest School, we hold exactly the reverse position with reference to white pine at least, and are convinced not only that such pruning can be successfully done but that it should form the basis for the treatment of our woodlands in many places.

Each system of silviculture has its distinct use and must make certain sacrifices to attain its ends. Our aim is to secure a fair quantity of large, clear, high-grade timber with a short rotation. To accomplish this we pay special attention to a small number of selected trees from the beginning. In the first stage of growth obtain by pruning and thinning a tall slender tree with clean bole of moderate length; then get a rapid diameter growth by keeping the remaining branches alive and enlarging the head to its full capacity.

Mr. Morton read a paper before the Massachusetts Forestry Association in 1899 telling what he had accomplished and describing his methods in detail. He found that the best time to prune the living branches of the white pine was in the hottest summer weather. The branch is cut off close to the bole of the tree; sap flows copiously at first but is quickly seared over by the heat, thereby sealing the wound against disease and preventing the streak of pitch so often found after winter trimming. The wound heals quickly by occlusion with no space or pitch pocket at the end of the small tight knot, and almost immediately outside of it the wood becomes clear and straight grained. As a fair sample of what we have found, the first piece of the Morton trees analyzed by us showed fifteen knots without a single one which failed to come up to this standard. Where a dead branch has to be taken off the cut is made deep enough to wound the living cambium entirely around the knot in order to produce the same quick recovery. For when a dead branch is broken or cut off without such wounding the growth is apt to continue for some years, much as though the branch were still there, forming a little tunnel to collect pitch and dirt.

During the first two years the proper amount of protection, light, air, and soil are maintained and a single leader secured for each selected tree and the neighbors are made subservient to it. When from four to eight feet high the pruning of live branches is begun, leaving the head about one-third of the height of the tree. This pruning of live branches and the protection from competitors is continued through the first period of growth. Not over two whorls are taken off in any year. At the end of this time we have a tree with a slender bole, no dead or sickly branches and a small but well developed head, closely surrounded though not crowded by more stocky trees. A typical tree with an eighteen-foot bole would be twenty-seven feet high with nine feet spread of crown, a diameter of four inches breast high and between two and three inches just below the first branch.

Now begins the second and final stage of growth. The trees have been chosen far enough apart so that they will not interfere with each other, no more pruning is done, the last small wounds heal quickly, and from that time on all the wood formed in the bole is clear. Through the ever increasing space occupied by the tree and the comparatively short stem, a good diameter growth is maintained to the end of the rotation and a large valuable log is obtained.

The Eric system of silviculture may be used in combination with several of the older forms, but the most promising treatment seems to be the three-story one. It may be applied in plantations, on areas where pine is mixed with coppice, and to especially good advantage on the many abandoned fields that are coming up by natural reproduction with a scattering growth of pine. The intermediate stages must vary with the condition of the tract when work is begun but a fully stocked woods ready for the final cutting of the upper story under a sixty-year rotation will consist of three ages—forty trees, sixty years old, ready to cut and occupying about eighty per cent of the space; forty moderate sized trees; and a greater number of small ones, the selected forty of which are just completing their first period of growth and require an insignificant amount of space. The nurse trees which have been retained increase the crown cover and prevent the stand from becoming too open underneath. The spring after cutting the upper story a dozen or more transplants are set out in each opening, and in twenty years another crop is ready to harvest.

Artificial pruning is a distinctive feature of the system and may be applied to many species. All foresters agree that most of our hard woods can be trimmed, when branches are small, without injury and to the great improvement of the quality of the lumber, and experiments by Professor Mer of Nancy, France, indicate that spruce can be added to the list.

I hope that investigators who see this article will send to AMERICAN FORESTRY or write to me, no matter whether in approval or condemnation, showing the results of their experiments; and I am particularly anxious that they should try Mr. Morton's method of pruning. Some of my German friends are going to experiment along these lines when the proper season comes around.

We have not done enough work as yet to be able to give accurate figures of cost and growth or to state closely where the line is drawn between the conditions of the tract and location in which such work would bring good financial returns and those where the growth is so slow that compound interest and risk would make the investment unwise at our present prices.

It is very important that different silvical systems suited to our varied conditions should be applied on a large scale, and as rapidly as practicable to transform our forest and waste lands in such a way as to give a sustained crop and additional wealth to the community. One of these should be either the plan outlined in this paper, as modified by further experience, or some other, producing the much needed clear lumber in a reasonable time.



MICROSCOPIC WORK ON THE STRUCTURE OF WOOD

By H. D. TIEMANN,

In Charge Section of Timber Physics, Forest Products Laboratory

IT IS remarkable that, in the present age of development of practical uses from scientific knowledge, there should still remain a field of very common and wide interest undeveloped in a practical manner. In the knowledge of the relationship of wood-structure to its physical properties and uses nothing appears to have been worked out in a complete and concise form such as to be of use to the busy man. This field of investigation might be better spoken of as an adjoining frontier, since it is the common ground upon which the technological knowledge of the properties and uses of woods, and the scientific study of the growth and anatomy of the wood substance from the botanical standpoint join together. In both of these separate fields an enormous amount of study has been carried on, and a great deal of knowledge exists, and there has been a number of very extensive works published in an attempt to cover the entire subject. Almost without exception, however, where the treatise is so broad in its scope, this frontier of knowledge has been narrowed down to a line or largely obscured. Such works, however, are beyond the use of the busy man because of their very comprehensiveness. As a rule it is the botanist who is most familiar with the anatomy or histology of wood structure, while he knows but little of the processes of manufacture of wood or of its use in framed structures. On the other hand, the manufacturer, carpenter and engineer know little or nothing about the microscopic make-up of the very material with which they are working and which they have been handling most of their lives. Why is white oak more lasting and better wearing than red oak, and why is the former suitable for light cooperage while the latter is not? Why are firs so difficult to treat with preservatives and pines so easy? Why is eucalyptus so difficult to dry? Ask questions like these of the artisan or engineer and what, as a rule, can he reply? Yet the answers are simple and can be clearly shown in a way to be at once comprehensible to the business man without scientific training.

As a rule, in works discussing the properties of woods where the microscopic structure is shown, it is done from the standpoint of the identification of species, and little or nothing is said in regard to the correlation of structure with properties and uses.

While it is fully realized that many of the properties of wood cannot be predicted nor explained from a microscopic examination of structure alone, yet it is believed that much information of value would result from a systematic study of this kind. Already the importance and effect of thoroughly drying wood for preservative treatment and the effect of steaming have been demonstrated by a study of this kind, made at the Yale laboratory of the Forest Service,* and the reason why white oak is suitable where red oak is

*In Bulletin 107 and 120 of the American Railway Engineering and Maintenance of Way Association 1909 and 1910, on the "Physical Structure of Wood in Relation to its Penetrability," by H. D. Tiemann.

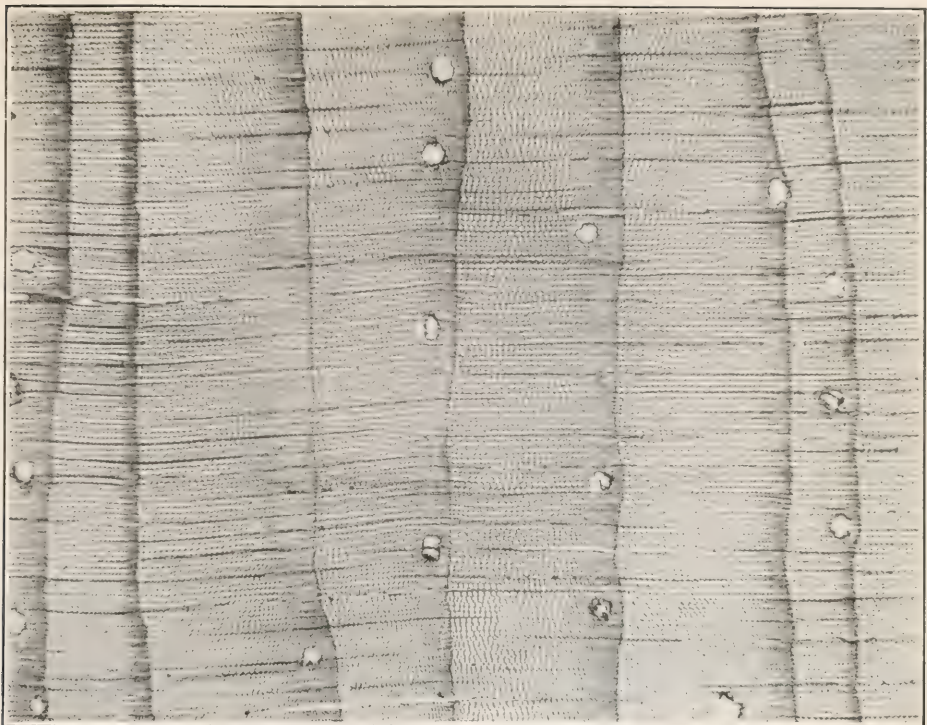


FIG. 1. CROSS SECTION SHOWING SEVERAL ANNUAL RINGS AND A NUMBER OF RESIN DUCTS

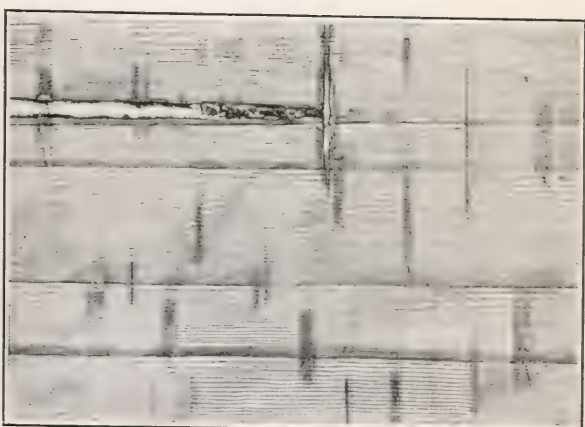


FIG. 2. RADIAL SECTION THROUGH SEVERAL ANNUAL RINGS, SHOWING A RESIN DUCT WITH TYLOSES. THE BORDERED PITS ARE VISIBLE ON THE WALLS OF THE TRACHEIDS



FIG. 3. TANGENTIAL SECTION SHOWING A VERTICAL RESIN DUCT FILLED WITH TYLOSES AND CROSS SECTIONS OF SEVERAL HORIZONTAL RESIN DUCTS IN THE MEDULLARY RAYS

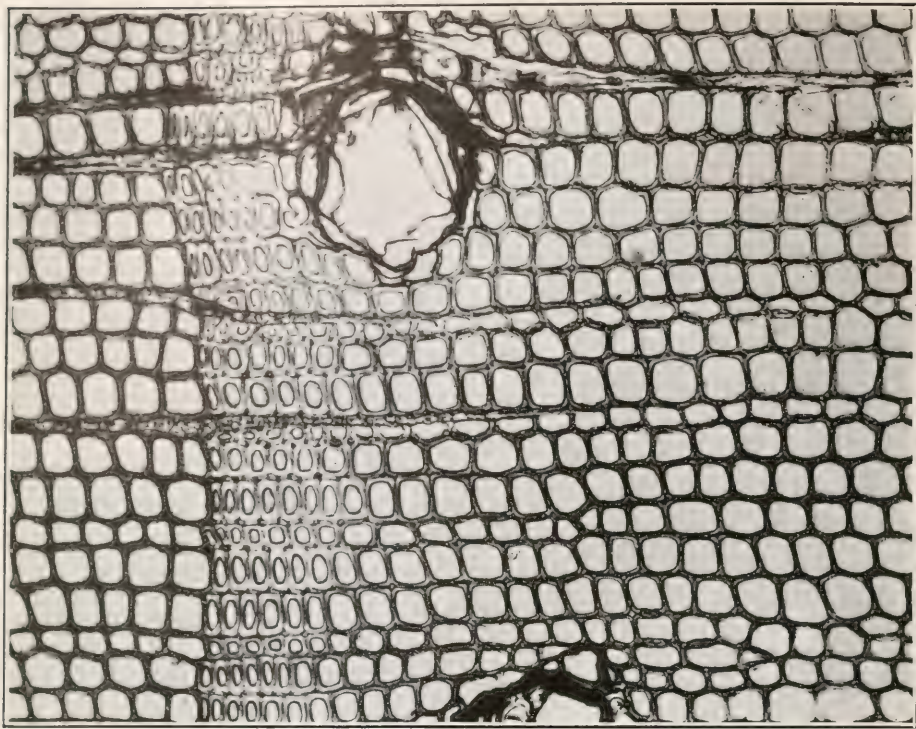


FIG. 4. CROSS SECTION AT JUNCTION OF ANNUAL RINGS, MAGNIFIED 300 TIMES. TWO RESIN DUCTS ARE VISIBLE



FIG. 5. RADIAL SECTION MAGNIFIED 300 TIMES. A MEDULLARY RAY CONTAINING A HORIZONTAL RESIN DUCT IS SHOWN AND THE UNION OF THIS WITH A VERTICAL RESIN DUCT. THE DUCTS ARE FILLED WITH TYLOSES FROM THE ENCLOSING EPITHELIAL CELLS. BORDERED PITS ARE ALSO VISIBLE.

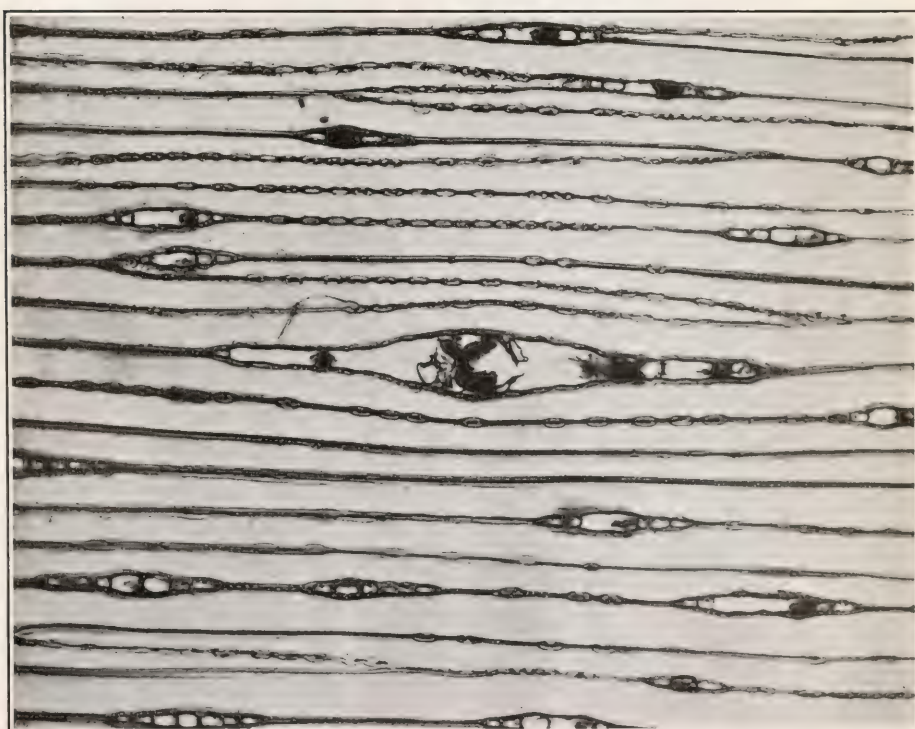


FIG. 6. TANGENTIAL SECTION MAGNIFIED 300 TIMES. A MEDULLARY RAY CONTAINING LARGE RESIN DUCT IS SHOWN IN THE CENTRE OF THE FIELD. BORDERED PITS APPEAR IN SECTION, LIKE LINKS OF CHAIN ON THE WALLS. THE TORUS IS VISIBLE IN MANY OF THE PITS.

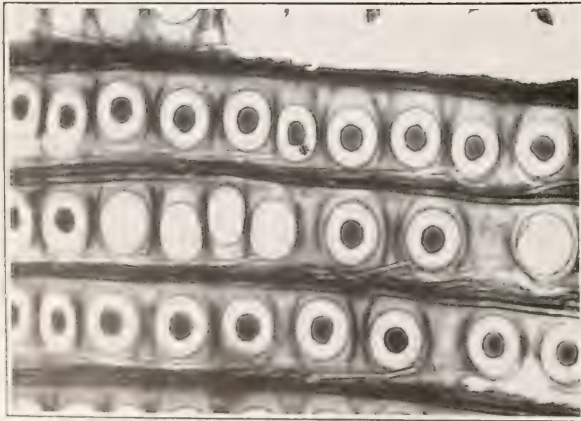


FIG. 7. RADIAL SECTION
MAGNIFIED 800 TIMES
SHOWING BORDERED
PITS. THE TORUS IS
VISIBLE IN MANY OF
THESE, APPEARING AS
A BLACK OVAL DISK IN
CENTER OF PIT

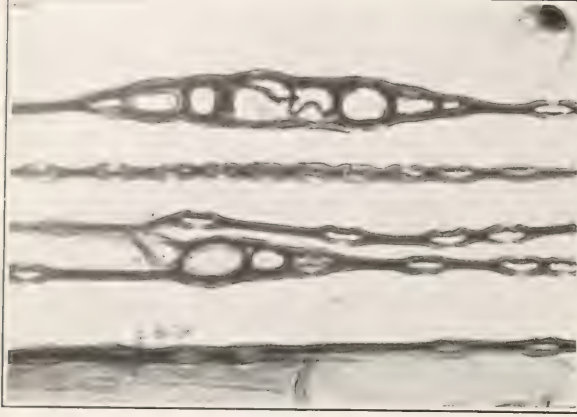


FIG. 8. TANGENTIAL SEC-
TION MAGNIFIED 800
TIMES, SHOWING BOR-
DERED PITS IN SEC-
TION. THE TORUS IS
SHOWN IN MANY
CASES PUSHED UP AND
SEALING THE OPENING

MICROSCOPIC STUDIES OF WOOD STRUCTURE

not has been clearly shown. A careful study of the structure of several woods and the changes which are produced in drying and under mechanical stresses was made at Yale laboratory by Mr. W. D. Brush under the writer's direction. A statement of his results, fully illustrated by excellent photomicrographs and drawings, appears in an unpublished Forest Service report.

The Service has planned a comprehensive line of work of this kind which is now under way at the new Madison Laboratory. (Other microscopic work on the histology of wood, but from the botanical standpoint, with a view to the identification of species, is also being carried on in Washington in the section of Dendrology.) The principal purpose of this work is to bring the two fields of knowledge mentioned before into relationship by making clear to the artisan, engineer or user of wood, the (microscopic) anatomical structure and differences in structure of various woods which underlie the physical and mechanical properties, and differences, in the material he is using and with which he is already familiar. New uses and reasons for not using various woods will also naturally be suggested.

To exhibit these facts, chief reliance will be placed upon photomicrographs of the wood sections and elements themselves. These will be arranged in a systematic and logical manner and will be shown at uniform magnifications so that the micrographs of all the different species will be directly comparable. The views will be supplemented by such descriptions and discussions as will lend clearness to the subject. This discussion will be in non-technical language so as to be intelligible to the persons for whom it should be chiefly valuable.

It is believed that this proposed publication will be unique in this respect. Among all the works covering these fields, nothing has been found with this specific purpose in view, and giving illustrations in a comprehensive manner and of uniform style. It is our purpose, as far as possible, to make the illustrations speak for themselves, which will be in a universal language not requiring translation.

The equipment of the laboratory for this research is very complete. As a foundation, a collection of important commercial woods is being made. The specimens consist of short logs from normal commercial trees, the sylvical conditions of the place of growth of each specimen being recorded. From these specimens small pencils are cut while green and preserved in paraffin or formalin without being allowed to dry out. The pencils are taken at a point about four feet above the root swelling and run from bark to center. Thus a representative piece is obtained for the microscopic sections. In many cases another piece is taken from the top of the same tree. Thus far about one hundred species have been obtained.

The first part of the work consists in the preparation of a complete collection of permanent microscopic slides. The small pencils cut from the wood specimens are treated in the usual manner for preparing microscopic slides, sectioned on a special microtome, stained and mounted in balsam. As a rule three samples are taken from each pencil, one from the sap wood, one from the main portion of the heartwood, and another from near the center of the tree. From these samples sections are made in three planes; transverse, radial and tangential.

The microscopic slides thus completed would be of little use to the public for the purpose intended without the next step, namely, the photomicrographs. A complete equipment for this work is installed at the laboratory, including a dark room and all accessories. The apparatus for making the photographs consists essentially of an arc light, a system of condensing lenses, ray filters for obtaining monochromatic light, microscope and lenses, shutter, camera

bellows and plate holders. In the apparatus here used, which is a Bausch & Lomb "Balopticon" and Zeiss microscope, the parts are mounted horizontally in the order mentioned. The heavy iron bases supporting the several parts are placed on rubber cushions under the feet as a precaution against vibrations, as a very minute vibration of the microscope is greatly magnified upon the screen. Non-halation orthochromatic plates have been found to give the best results, although ordinary plates may be used with fair success. The process of taking the photographs through the microscope does not differ materially from that of taking an ordinary picture with a camera by use of a color screen or ray filter. The art of making these micrographs consists largely in obtaining a uniform illumination of the field and the proper focus. To focus properly requires experience, as it is not possible to show on the screen exactly what one sees through the microscope with the eye, since in the latter case a slight adjustment is made by the eye, whereas in the camera the focus is dead and in one plane only. The effect of perspective is lost in the camera. Of course the result in every case is absolutely dependent upon the slide, which, for the best results, must be of the proper thinness, correctly and uniformly stained, absolutely flat, clean and free from air bubbles. It must also be of sufficient size to cover the field desired.

To illustrate the wood structure, two or more magnifications will be used, a low power of perhaps 30 or 50 diameters to show the general appearance, and a higher power of perhaps 300 diameters to show the minute structure in detail. Higher magnifications also will be used when it is desired to show remarkable features such as bordered pits, for instance.

The largest views taken will be eight by ten inches, which can be subsequently reduced to any size for publication. The accompanying photographs are given as illustrations of the views to be shown, and are made from sections of Bull Pine (*Pinus ponderosa*). Figures 1 to 3 are magnified thirty times; 4 to 6, three hundred times; and 7 and 8, eight hundred times. Similar views to these are to be made of the various important species so far as any visible distinctions can be shown, and an attempt made to show, as far as possible, the interpretation of these features or distinctions in the outward properties, and distinctions in properties, of the various woods. In some instances it is contemplated to show in addition to the sections the individual separated elements.

The work is being done by the section of timber physics, and is in the hands of experts in this line. Miss Eloise Gerry, who is making the sections and slides, comes to us from Dr. Jeffrey of Harvard, and Mr. Simon Kirsch, who is making the photomicrographs and has general oversight of the work, is from the late Dr. Penhallow of McGill University.

It is not our belief that a study of this kind will ever fully explain the differences in the mechanical and physical properties of different woods, nor can it be hoped to offer a means of predicting with completeness how a new or unknown wood will behave. Such points must be determined chiefly, as heretofore, by direct actual tests of the properties in question. Even were this prediction possible, it is very doubtful whether it would serve any practical use, since ordinarily it would be easier and simpler to make the direct test than to cut, prepare and examine the sections under the microscope. However, while it may never be possible to completely predict the properties, certain uses and behavior of the species under given conditions will most likely be indicated and suggested and much clarity and light will be thrown on the causes of the behavior of the various woods under certain conditions and treatments. It has been the experience of the past that wherever knowledge of fundamental truths has been brought to light, important results have fol-

lowed. It is impossible to foretell explicitly the benefits which may arise from a clearing away of the clouds hanging over this adjoining border land of knowledge, but it is reasonably certain that benefits will result fully commensurate with the expense of the task.

BIBLIOGRAPHY

The following are some of the most important works referred to, in which the entire subject in the two fields of knowledge is more or less covered.

One of the earliest comprehensive works of this kind, and still a standard in many ways, is that of Dr. H. Nördlinger, published in 1860, "Die Technischen Eigenschaften der Hölzer, für Forst und Baubeamte, Technologen und Gewerbtreibende." (The Technical Properties of Timber for Forest and Civil Engineers, Technologists and Manufacturers.) For the mechanical properties Nördlinger relied largely upon the previous work of Chevandier and Wertheim. He added a description of the anatomical structure of the various species of wood with a view to explaining many of their properties from the anatomy. He treated also upon their chemical and physical properties, including durability and defects. A more recent publication by the same author appeared in 1890: "Die Gewerblichen Eigenschaften der Hölzer." (The Industrial Properties of Timber.)

Another work, in French, "*Le Bois*," was published by J. Beauverie in 1905. In this work, which covers 1,400 pages, the attempt at extreme comprehensiveness is made. Every phase of the subject of wood is gone into, from a botanical description of the trees to the manufactured products. Much space is also given to insect and fungus enemies of the trees, and a description of the forests of the world is given. A table is added grouping the woods by their anatomical structure and giving the uses. The work is really an encyclopedia and is almost too comprehensive to be authoritative in any one line.

"Die Forstbenutzung" (Forest Utilization), by Karl Gayer and Heinrich Mayr was published in 1909 as a tenth edition. It contains 630 pages and also covers a very wide range from the growth of the timber in the forest to its ultimate use, including all by-products, even the soil.

The works of Theodore and of Robert Hartig should be mentioned in this connection, and also Lorey's "Handbuch der Forstwissenschaft," published in 1887 in three volumes, and recently a second edition in four volumes.

In the way of descriptive material, the collection of actual wood sections made by Dr. Nördlinger and published 1852-1860, "Querschnitte von 100 Holzarten" is worthy of record, and more recently, the similar and larger work on "American Woods" by R. B. Hough.

In English not very much of an extensive nature has appeared in this line. One of the best works is by Boulger, entitled "Wood," of which the 2nd edition was published in 1908. In this book a number of photomicrographs are given of wood sections. "Timber and Timber Trees," by Laslett, 1894, touches upon the structure as an introduction to a description of the mechanical properties of commercial woods. Herbert Stone, in his "Timbers of Commerce and their Identification" (1905), goes so far as to show a slightly magnified photograph of each species described. A publication by J. R. Batherden, in 1908, entitled "Timber," gives a brief description of many commercial woods but very little on the anatomy.

One of the best publications in English, discussing the structure of wood and its relation to its properties, is Forest Service Bulletin No. 10 by Filibert Roth on "Timber," published in 1895. Bulletin 13, "The Southern Pines," by Mohr and Roth, and Bulletin 22, "The White Pine," by Spaulding and Fernow, are also of value from this point of view.

There are also other publications touching more or less upon this subject, but the above is intended only as a brief review of some of the best works.

As stated in the beginning, there is a vast amount of literature covering the anatomy of woods, and also their mechanical and technical properties and uses, but only such works as touch upon the relation of the two fields of knowledge have been cited in this review.

THE FOREST AND THE FARM

LIBERTY H. BAILEY, the dean of the New York State College of Agriculture, delivered an address at the University Club in Buffalo, on the country life movement in America, which, if we may judge from the newspaper reports, was full of the wisdom we always expect from him. Mr. Bailey admitted that present conditions in the country were bad, but he declared that these conditions would soon be of the past. Before many years co-operative farming, new methods, new social customs, new relations with the city, would have worked out a complete change in the business of farming and the lot of the individual dwellers on the land.

But the point of especial interest to us was his plan for utilization of abandoned farm lands, those that have passed out of profitable use forever on account of changed conditions. "Yet," he declared, "they are not useless. It simply does not pay to handle them and they should be put to their destined use." He noted the development of wheat and corn growing on a large scale in the west, leaving truck farming to the east, and that is profitable only near large cities or good transportation. Then he said, as reported, "I am strongly in favor of a system of some sort of county ownership or state ownership. Let the community buy these abandoned lands as it could very cheaply. Let it reforest them. Most of the hill-tops in the Adirondaek region and the center of the state could most profitably be converted to that use. Others could be used for raising live stock, others again to raising apples for export. Individual ownership should not be allowed to drop in applying these methods. It could go on and afford good livings to many farmers. But the state should no longer allow those lands to go to waste for want of a little enterprise and co-operation."

There was much more, but in this suggestion of community ownership and reforestation we believe lies the solution of much of the abandoned and waste land problem of our densely populated eastern states. Even in such a populous state as Massachusetts more than half the land can only be profitably used to grow trees. In part they may be orchard trees, for wonderful fruit can be raised on some of these discouraging looking New England hillsides. But on the larger part of this acreage forest trees must be the solution. The future welfare of these states demands that this plan be adopted and soon. Already many of our eastern farmers are learning that their woodlots are not by any means the least of their possessions. Perhaps by and by our towns, counties and states will learn to follow the example of the thrifty communities of Europe and turn their waste lands into bank accounts for the people.



FRANCONIA NOTCH FROM NORTH WOOD-
STOCK, NEW HAMPSHIRE

TYPICAL WHITE MOUNTAIN FOR-
EST CONDITIONS



SKIDWAY WITH FOUR-HORSE TEAMS
UNLOADING, SCALER SCALING
LOGS, AND THREE LOADED CARS ON
TRACK; NEW CAMP ON RIGHT.
LINCOLN, N. H.



GRADED LOGGING ROAD; GRADING
COST \$16 PER MILE. FOUNDATION
FOR TRESTLE IN FOREGROUND.
NEW EXTENSION OF LOGGING RAIL-
ROAD THROUGH FRANCONIA, N. H.

TYPICAL WHITE MOUNTAIN FOR-
EST CONDITIONS



NEAR SUMMIT OF MT. ECHO,
WHITE MOUNTAINS. FIRE CON-
SUMED THE SOIL TWENTY-
THREE YEARS AGO AND LEFT IT
PERMANENTLY BARREN



MT. WEBSTER, WHITE MOUNTAINS,
MADE PERMANENTLY BARREN
BY FIRE AND EROSION FOLLOW-
ING THE AXE. THIS IS WHY
WE WANT PROTECTIVE FORESTS
ON STEEP UPPER SLOPES

TYPICAL WHITE MOUNTAIN FOR-
EST CONDITIONS



MT. ADAMS, WHITE MOUNTAINS,
SHOWING HOW FIRE RAN OVER
DURAND RIDGE AND BURNED THE
SCRUB

TYPICAL WHITE MOUNTAIN FOR-
EST CONDITIONS

FOREST PROTECTIVE LEGISLATION PROPOSED BY WISCONSIN

BY E. M. GRIFFITH
STATE FORESTER OF WISCONSIN.

(An address delivered at the Lake States Fire Conference, December 4.)

ALL thinking people realize that the wonderful forest wealth of this country cannot be conserved through wise use until the government, the states and the private owners are willing to spend the large sums which will be necessary to stop the annual and appalling loss from forest fires. This country is growing out of its irresponsible boyhood days, with its reckless waste and utter disregard for the future, and as it has grown older, and as elbow begins to rub elbow with the enormous increase in population, we are beginning to learn a truth long known in older countries, that the state in order to do its duty to all its citizens must use its general police powers much more freely than in the past, and that the selfish interest of the individual must give way to the infinitely greater good of the whole people.

This academic introduction is merely to prepare your minds for the extensive fire protection system which we hope will be adopted by the state of Wisconsin; which will cost a very large sum and will oblige the state to exercise its police powers, so as to protect not only its own timberlands, but those of all its citizens as well.

The United States census for 1900 gave Wisconsin the proud position of ranking first among all the states in the production of lumber. The census of 1910 will show that Wisconsin has fallen back in these ten years to eighth place, and that her production of lumber in the same period of time has decreased forty per cent, which is more than that of any other state. The wood using industries of the state, not counting the saw mills, use annually over 930 million board feet of lumber, valued at \$20,000,000, but the state will lose these industries, and many others even more important, as saw mills, paper and pulp mills, etc., unless all forms of needless waste are stopped, and certainly forest fires are the most useless and needless forms of forest waste.

The Lake States Forest Fire Conference proves that the severe fire losses of 1910, following the even greater losses of 1908, have aroused us all as never before, and if our legislators can truly appreciate the situation, I am sure they will not fail to act. Let us see what the fire losses have been in Wisconsin. In 1908, according to the reports of our fire wardens, 1,200,000 acres were burned over, and the loss in timber and young growth amounted to \$9,000,000. For 1910 our reports are still incomplete, but those received indicate that at least 1,000,000 acres have been burned over, and that the financial loss will amount to several million dollars. The direct loss of merchantable timber, however, is not by any means the most serious in its lasting results, but rather the loss of the industries which depend upon the forests for their raw material, and the still greater ultimate loss through the destruction of young, growing timber, upon thousands of acres which are burned over every year.

Wisconsin has a wealth of fertile land awaiting cultivation, but she also has large areas more valuable for forest growth, and the people of our state do not as yet begin to appreciate the great future value of the young timber upon such lands, and the careful protection which such small timber needs. Mature merchantable timber which is burned can often be cut and so saved, but young timber when burned is almost always a total loss.

At present Wisconsin has the following system of town fire wardens: The state forester is authorized to appoint as many fire wardens in each organized town in the state as he deems necessary, and we now have over 500 fire wardens in the northern or forest portion of the state. These fire wardens post notices, have authority to call upon any person to assist them in fighting fire, are given the same authority as sheriffs to arrest without a warrant, and when in their judgment a dangerously dry time exists, and it is unsafe to set fire for clearing land, or for any other purpose, they have the authority to post special warning notices, forbidding the setting of any fires. The fire wardens and the men called out by them, are paid by the town boards for the time which they actually serve at a rate not exceeding 25 cents per hour, but the total amount which can be expended annually is limited to \$100 per township, or 36 sections. It will be noted that the fire wardens have a considerable amount of authority, and as the best available men, irrespective of politics, have been appointed, they have put out thousands of small fires and thus averted much heavier losses, but the whole system is faulty from the fact that it is based upon the plan of putting out fires after they occur, while it is now becoming a well known truth that the greatest efforts in forest protection should be centered upon fire prevention.

It must have been an old forest fire fighter who coined the expression "An ounce of prevention is worth a pound of cure," and probably he had seen as we nearly all have, a small neglected blaze fanned and spread by the winds until it became a fire of such proportions that men were powerless before it.

The present limit of expense in fighting fire of \$100 per township is absolutely inadequate in very dry years, such as 1908 and 1910, and in such times when the wardens are needed the most is no time to have the financial cog of the system break down.

Theoretically, the plan of allowing fires to be set at any time, except when the local fire warden posts notices forbidding any fires, is correct, for it imposes the least possible interference with individual rights and especially the clearing of forest lands by settlers in order to make farms, which is of course so necessary, provided it is done at the proper time, and in the proper manner, so as to avoid the wide destruction of the past. Such enormous damage has been done in Wisconsin for the last six years, through fires set by settlers in clearing land, and it is so difficult to secure convictions as the settler can merely claim that he did not see the special warning notices forbidding the setting of fires, that we feel that we have the cart before the horse and that a radical change in the law is demanded.

We must prevent as far as possible the starting of forest fires, and therefore the state board of forestry of Wisconsin has decided to urge upon our legislature the great importance and necessity of providing a forest fire patrol in northern Wisconsin, upon the following lines:

A chief forest fire patrol, appointed by and under the supervision of the state board of forestry, with headquarters at some central point. He should be a practical woodsman, with a wide knowledge of the northern part of the state, and the ability to handle men. He should be supplied with an office and such clerical help as may be necessary.

In each of twenty-five or more of the northern counties there should be located at some central point a head county fire patrol, in charge of the work

in his county. He should be under the direct orders of his chief, report to him weekly, be obliged to keep one or more saddle horses, and cover every part of his county at stated intervals.

Under the direct supervision and orders of the head patrols in each county would be county forest fire patrols, varying in number according to the size of the county, and the amount of forest land to be protected, but sufficient in number so that each man would not have over 40,000 acres of land to patrol. For the twenty-two northern counties which it is proposed that the patrols shall cover, it is expected that at least 322 men will be required. The plan is that all these men shall be secured from lumber companies who only operate in winter, as thus their best men would be given work every summer, the state would secure the services of trained woodsmen, and both the state and the lumber companies would gain the great advantage of having permanent men upon whose ability they could count. Each county patrol would have a given territory to look after and for which he would be responsible, they would live in cabins or shacks, and whenever possible they would be mounted so as to patrol quickly and to get to a fire with the least possible delay. They should be instructed to at once call upon every settler in their territory, explain the fire laws thoroughly, and in every way try to make the settlers appreciate that they are working for their interest and want their hearty co-operation.

As soon as funds are available, telephone lines should be built to connect all the patrol camps or cabins, so that the head patrol could call all his men together at any point in the county to fight fire, and wherever possible watch towers should be built, where men would be stationed in dangerously dry times to immediately report signs of fire in any direction. Such watch towers have been built by the lumbermen in Maine and have proved very useful.

During wet seasons when there is practically no danger from forest fire, the head patrol in each county should call his men together and clear up old logging roads, logging railroad rights of way, trails, etc., so that they could be used as fire lines. This is very important as our experience in fighting fires for the last few years has proved over and over again that the men are seriously handicapped in checking fires promptly, from the fact that there are so few roads which are kept clear of brush, and therefore they have no fire line to fall back upon in case of necessity. Much good can also be done by felling old snags, which are the means of spreading fire to a great distance in a heavy wind and also by burning at favorable times heavy and dangerous slash where it is a constant menace to adjoining timber or other property.

In this connection it should be noted that it is proposed to include in the law an important provision giving the state board of forestry power to order the burning of dangerous slash, so as to provide a reasonably wide strip next to adjoining property which is menaced by such slash, and that if the owner of the land or the timber fails to comply with the order of the board within a specified and reasonable period, the state board of forestry shall burn such slash, the cost thereof to be a first lien upon the land or timber. If the state of Wisconsin is not to have a general slash burning law, it is absolutely necessary that the state, through some board or commission, should have the right to determine when and where slash is such a public nuisance that it must be destroyed. In this way each case can be carefully considered and the law, if enforced fairly and efficiently, should be a very effective means of forest protection.

One of the most important provisions of the proposed law is to provide that no fires shall be set by any one from April 1st to December 1st (except for warming the person or cooking food) without a written permit from a patrol or fire warden. This would mean that any fires set for the purpose of

clearing land, burning brush or slash, without a written permit, would be absolute evidence of violation of the law, sufficient to secure conviction. The objection may be raised that the settler is obliged to use fire very freely in order to make a farm on land covered with young timber, brush and slash. This is of course true, but our records of forest fires in Wisconsin for the last six years show that from forty per cent to seventy per cent of all the fires have been caused by settlers burning brush. A large proportion of the settlers in the forest regions of the state are grossly negligent in the use of fire, and often apparently indifferent to the damage which they may cause to the property of others. They frequently select the driest and most dangerous times to start their fires, and fail to take reasonable precautions to prevent the fire spreading.

Under the proposed plan, the local patrols and fire wardens would be authorized, as agents of the state board of forestry, to issue permits to set fire when it was safe to do so, and the patrols would be instructed to assist new settlers by showing them how to burn safely and to use their authority reasonably, so as to secure the co-operation of the settlers. Campers, hunters and fishermen must be allowed to build fire at any time, as this is necessary both for cooking and warmth, but the patrols should keep in close touch with all such parties and arrest them promptly for leaving a camp fire unextinguished.

It will be noted in this proposed plan that the patrols are intended in every possible way to prevent the starting of fires. They will of course be a well organized body to fight fires when they occur, but their first and main duty will be to prevent fires starting. However, under the best possible system some fires will always occur, and in order to have an auxiliary force, under the direction of the patrols and which they can call in time of necessity, it is proposed to appoint county fire wardens and do away entirely with the present system of town fire wardens. Many of the town boards have seriously handicapped the work of the wardens by failing to promptly pay the wardens, and the men called out by them. Men will refuse to fight fire if they are obliged to often wait a year for their pay. Most town boards are also strongly averse to allowing any pay if their wardens help to fight fire in adjoining towns, though such fires may at any time destroy much valuable property in their own town. Therefore, it is necessary in order to secure good results to appoint the wardens for the county, instead of the town, and give them full authority to fight fire anywhere in their own or adjoining counties. The present limit of \$100 per township, or 36 sections, for fighting fire is entirely inadequate, and therefore it is proposed to increase the limit which any county may expend in any one year to \$300 per township. Thus, if a county contains 20 townships it could expend a total of \$6,000 in fighting fire, but it should also be provided that the county board of supervisors could exceed this amount in cases of great necessity.

In order that the fire wardens and the men called out by them should be paid promptly, it is proposed that the state shall pay the men and collect the expense from the counties. The patrols should keep in close touch with the wardens and arrange with them as to the men who should be called out in case of fire, and thus build up a well trained organization for the control of forest fires.

Wisconsin now has a forest reserve of some 340,000 acres, largely upon the headwaters of the Wisconsin and Chippewa rivers, but in order to protect this important watershed, preserve this beautiful lake region as a summer resort for the citizens of Wisconsin and other states, and also to have a forest reserve large enough to be a factor in supplying the wood using industries of the state with timber, the state board of forestry will urge the necessity of acquiring a forest reserve of approximately 2,000,000 acres. The land must be purchased and in order to raise the necessary funds for the creation of an

adequate forest reserve, including its protection and improvement, and also to pay for the fire patrol system in northern Wisconsin, the legislature will be asked to grant the state board of forestry the proceeds of a two-tenths of a mill state tax for a period of twenty years. This general state tax will yield a yearly revenue of approximately \$600,000, and it is estimated that the cost of the patrol system will amount to \$250,000 per year. However, the amount which may be expended in the patrol system should be extremely elastic in order to meet varying conditions, and the forestry board should be authorized to expend the entire income of the department if it was found necessary to do so, in an unusually dry and dangerous year.

At first glance, \$250,000 may seem a very large amount to expend annually for forest fire patrols, but in the 22 counties which it is proposed to patrol, there are about 12,000,000 acres of wild or unimproved lands, most of which are covered with some kind of forest growth, so that the cost would be from two to three cents per acre, and if the patrol system is at all successful, in protecting property, the cost will really represent a very low rate of insurance. Nothing has been said in regard to fires set by the railroads, and this is not from lack of full appreciation of how serious the loss has been from forest fires set in this way, but from the fact that the best remedy has not been found, though both the state of Wisconsin and the railroad officials are working to solve this difficult problem. Our records show that in ordinary years the railroads are only responsible for about fifteen per cent of the forest fires, but the past summer was so dry that the least spark would start a blaze and therefore in 1910 the railroads started about twenty-two per cent of the fires.

There are many kinds of spark arresters that will prevent the escape of all sparks, but none has yet been found that will both prevent the escape of sparks and still allow the engine to steam freely, and pull its load. But many men are working to solve this problem and the correct solution should come in time. In the meantime, however, the spreading of forest fires must be stopped, and it is simply a question of the best and most effective methods. Some advocate that all railroad rights of way be kept absolutely clear on both sides of the track. Others place more faith in a close fire patrol on railroad lines, especially of patrols on speeders who will follow up each train and extinguish all small fires that are set. Personally, I believe that a combination of fire lines and patrols, will prove most effective, but that every effort should be made to find a spark arrester that will still allow the engine to steam freely.

The American people as a whole are uncivilized in their apparently stoical indifference to the appalling annual losses from forest fires. The problems involved are tremendous ones, but they can be solved if only the nation, state and individual care enough to devote the hard work and large sums that will be required. This Lake States Forest Fire Conference leads me to hope that the time of mere talking is drawing to an end, and that very soon real action to save our forest resources will commence.

SOME THINGS A FOREST RANGER SHOULD KNOW

By C. H. SHATTUCK.

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A BRIEF summary of the information which a young man about to enter the forest service as a ranger should have may be of interest. In my judgment the first essential is a knowledge of the general geography of the district which he is to supervise. It is very necessary that he be able to direct those under him as to the location of meadows for the pasture of horses, the name and course of various streams, the trend of mountain chains, and the names and locations of prominent peaks. He should have a very thorough knowledge of roads, trails, and the location of cabins, and the manner of constructing each. He must also know how to handle horses. The ordinary mountain cayuse instinctively knows the tenderfoot, and will proceed on the slightest provocation to reveal bits of equine ingenuity which are sometimes surprising and often aggravating in the extreme.

It is imperative that he be familiar with the business of packing; this can only be acquired by actual practice, either in his college course or in the field. Many a young man has come to grief in the practical rangers' examination because he could not put up in a permanent manner a conglomeration of cooking utensils, axes, shovels, cross-cut saws, provisions, and sleeping and wearing apparel. He must know how to throw the diamond-hitch and the various swings and loops for holding each of the above necessities on the back of a sliding, climbing, jumping horse. Roads and trails are often steep and sometimes barred by various sized logs, the jumping of which by the horses tests thoroughly the packer's skill in the use of rope.

The ranger must be able to select suitable provisions and must know how to do ordinary cooking. He must have things which cannot be brought from the far-a-way bakery. Bread must be made, meats prepared and cooked, and various vegetables and cereals come in for their share of attention. Making camp is another important feature. In selecting a site the essentials are: Good grass for his horses, good water for camp purposes, if possible good fishing, and in dry seasons, such a location that the fires may not burn his entire outfit. In addition he should make it his business to be familiar with the forest laws, and the rules and regulations affecting his reserve. He should know as intimately as possible the people who reside within the boundaries of his district, as much of his success will depend upon the wise and tactful manner in which he conducts himself in all his relations with them. He should know, if he should be in a grazing region, the brand and ear-marks of the stock in his district, and the approximate number owned by each individual. He must know the timber of his district both as to stands and kinds of trees. If lumbering operations are conducted he should see to it that the cutting and

burning is carried out according to contract. In much of this western country it devolves upon him to act as a protector of game. The actual settlers are generally glad to stay within the limits of killing fixed by the game laws, and they do not approve of the intrusions of the poacher, whose main object is to kill as much as possible without regard to law. As an officer of the law, the ranger is a great influence in ridding the reserve of ruthless hunters who kill often for horns and teeth only.

Such in brief, is the essential information which a ranger should have. Over and above this he should be a man who is able to impress those with whom he comes in contact with the idea that he stands for law, for justice to all and malice toward none. He must be fearless in the exercise of the duties devolving upon him, some of which require courage, and others great powers of physical endurance. It is desirable that he be not too far removed from the land of his birth, as the native will be much more apt to deal in a manner to be commended with the many perplexing problems constantly coming up than one brought from a distance.



EDITORIAL

WORK UNDER THE NEW FOREST LAW

THE Forest Service had been preparing for action in view of the probable passage of the Weeks bill for some time before it became a law and no time was lost in preliminaries. All arrangements have been made for making public the necessary information and for putting men in the field, so that purchases may be made before the close of the fiscal year. It is, therefore, timely to consider what is needed to obtain most promptly the results expected from the law.

As already stated, conditions are so acute in the White Mountains and the territory to be considered is so much more circumscribed than in the south that immediate action is called for there. It will also be easier to make purchases in that section during what remains of the fiscal year because titles are so much clearer than in the southern mountains, and the owners are so much less numerous. It may fairly be expected then that the first action to be taken by the government authorities will be in the White Mountains.

In these mountains, owing to the local conditions, the primary need is to secure for protective purposes the timbered upper slopes on the several drainage areas, all of which are in danger of early destruction and are needed to be preserved to protect the ultimate water sources and the soil without which these mountain-sides will be of little use.

Next in order would seem to come the cut-over upper slopes in the same regions, in order that the work of restoration may begin before the soil denudation is completed.

Third, the administrative units may be completed by acquisitions on the lower levels. Thus the work of protection, which is the main purpose of the law, will be logically developed.

Finally, there are two areas outside of the White Mountains proper the protection of which is necessary to comply with the purposes of the law. One of these is the great forested north country of Coos County, about the headwaters of the Connecticut, the most important navigable stream of New England. The other is the Magalloway country in Maine and New Hampshire, an important part of the Androscoggin watershed. We believe that the full carrying out of these plans involves the purchase of about a million acres in the north, and that something over four million acres are needed for the national holdings in the south, where the exact areas are not yet so definitely indicated. In the northern mountains the plan has been carefully studied by many experts and the requirements are well understood. There need be little delay, therefore, in mapping out the exact plan of procedure.

In the announcement made elsewhere of the plans of the department we call especial attention to Secretary Wilson's statement that he expects a great deal of public spirit to be shown in offering lands to carry out this great policy. We hope he may not be disappointed.

AN UNFRIENDLY APPOINTMENT

WHAT the Speaker of the late House of Representatives was a bitter enemy of Appalachian-White Mountain forest legislation and that he is a determined and persistent fighter were perfectly well-known facts. We hardly supposed, however, that he would carry his hostility after the Weeks bill was passed to the point of naming, as one of the National Forest Reservation Commission provided for under the new law, a man who had been always an opponent of the measure, unwilling to see any good in it, and whose residence on the Pacific Coast precludes knowledge of the conditions in our eastern mountains. So incongruous did this appointment seem that a long statement was made to some of the newspaper correspondents to explain why Mr. Hawley of Oregon would be a peculiarly useful member of the Commission.

Of Mr. Hawley's integrity and sincerity we make no question and we believe he will act conscientiously as a member of the Commission. We believe, however, that it is quite unprecedented to appoint to administer a law a man who is so entirely out of sympathy with its purpose and unacquainted with the conditions it was framed to meet. In making such an appointment Mr. Cannon simply showed his continued determination to oppose the new law and to do what he could to make it a failure. Fortunately, this is very little since Mr. Hawley is but one of seven.

It may be a question under the terms of the act whether any of these appointments are valid beyond the term of the 61st Congress. For the act says: "Provided, that the members of the commission herein created shall serve as such only during their incumbency in their respective official positions, and any vacancy on the commission shall be filled in the manner as the original appointment."

These members were appointed as members of the 61st Congress by the presiding officers of that Congress. Does this appointment run beyond the life of this Congress?

THE REPORT ON THE LUMBER INDUSTRY

THE report on the lumber industry by the Commissioner of Corporations, Herbert Knox Smith, of which we have already published a summary, is a document that yields new light on close study; but its importance should not be exaggerated. There is an old story, familiar to everyone, of the shield one side of which was silver and the other of gold, and of the controversy that arose between two men each of whom looked at only one side. It may be suggested in passing that Commissioner Smith's report was made by an able lawyer whose especial business has been hunting for trusts and monopolies and the consequences thereof. His report on the lumber industry reflects this acquired attitude. It looks at one side of the shield only, and its value must be rated with that in mind.

The first fact suggested by it we briefly called attention to last month. The concentration of timberland ownership which forms the burden of the report is the result of a public policy which we now see was lacking in wisdom and forethought, although it seemed to fit the conditions of development of a new country. The result has been, instead of the general distribution of the national wealth which was intended, concentration of this wealth in comparatively few hands. For this there is no remedy and we must simply accept the fact. As we have said, the fact is an argument plain and unanswerable for national or state ownership of as large a part of the forests

that remain as possible, and for the thorough development and management of these public holdings so that they will constitute the chief single factor in lumber production and so equalize conditions and balance the market. This is not an easy goal to arrive at, but it is practicable. Our national and state forest services must be developed to the highest point of efficiency and they must have the people back of them for they represent the people's end of this enormous business.

Another thing that does not appear in this report but may in the sections that are to follow is the difference between these large timberland owners and the lumber manufacturers and the small owners. We surmise that in any controversy that may arise the side of these latter factors would be the people's side. Their interest is against concentration of ownership in private hands of the timberlands from which their industry derives its life. Right here it may be appropriate to make an observation about the so-called lumber trust, the bogey which is so often brought out to frighten the people and irritate the lumbermen. Commissioner Smith has shown the possibility of a timberland trust but that there is any likelihood of a dominant trust in lumber trade or manufacturing, no one can believe who has the slightest knowledge of the condition and of the keenness of the competition to the extent almost of chaos. A sharp distinction must be drawn between the ownership of timber and the lumber industry. Sometimes they go together. Often they do not.

Another point should be noted. Mr. Smith discusses the rise in the value of standing timber, solely from the point of view of the concentration of ownership and consequent control of production. This should be considered in connection with other conditions that normally affect prices. The rapid decline of the available supply in the face of an increasing distance and difficulty of access of the available supply are two important elements which would inevitably cause a large increase in cost if there were no holdings of over a hundred acres in the country.

These notes on the report are intended rather as suggestions than as discussion. We wish that a forestry expert might have been joined with the Commissioner of Corporations in this investigation because it seems to us that in that case we should have had a broader report and more conclusive results.

THE SECRETARYSHIP OF THE INTERIOR

WE WELCOME the appointment of Mr. Walter L. Fisher to the secretaryship of the Interior as that of a man who has shown a high sense of honor and of public duty, sound views, and an exceptional capacity for independent judgment. His record and affiliations justify confidence that he will administer his great department with an eye single for the general welfare.

The retirement of Mr. Ballinger is not to be regretted. The controversy of which he was the center assumed unfortunately so personal a character and was so obscured by political considerations that it failed to be disposed of to anybody's satisfaction. The fact remained that Mr. Ballinger had become, justly or unjustly, *persona non grata* to the American people as a cabinet officer. His usefulness ceased some time ago. The continuance of the personal feud embarrassed many departments and bureaus of the government, and the change will be a relief that will work to the public advantage. The whole episode was most unfortunate and our relief that it is over is so great that we do not care to revive any of the old questions.

A BOURBON OF BOURBONS

IT IS much to be regretted that the country as a whole does not know Senator Heyburn of Idaho, and his unreason and absurdities are not always analyzed and valued at their real worthlessness. We have actually seen editorials from papers in the east accepting as valid his violent attacks on the Forest Service and making them the text of approving discussion. To those who are acquainted with the methods and habits of mind of the senator from Idaho this seems impossible. It should be understood that he is against the Forest Service, all its works, and anything connected with it. With this knowledge as a key, much can be understood and allowed for. His is a Bourbon mind—never learning and never forgetting anything. His attack on the new national forest bill when it was before the Senate on the fifteenth of February was so absurd as to be a serious reflection upon the dignity of the Senate. With some opponents argument is possible. Senator Heyburn's method is to press his point by brute force and yield only when overcome by greater force. With him argument is impossible.

THE CRAWFORD NOTCH IN DANGER

AS THIS is written, the project for the purchase of the Crawford Notch by the state of New Hampshire halts in the Legislature. Meanwhile a hundred ax-men have already begun the work of denudation.

We have commented recently more than once on the notable progress made by New Hampshire in forestry, and it is incredible that the state can be so blind to its own best interests as to allow this opportunity for self-help to slip by. In times past narrow and selfish interests have too often dominated the state to its own detriment, but the recent awakening, the progressive legislation, and the election of Governor Bass all gave promise of better things. Here, however, is an opportunity that is likely to be a test. The cost is not excessive. One hundred thousand dollars is a reasonable price for this property when its many-sided value to the state is considered. On the other hand, New Hampshire cannot afford at any price to have the Notch denuded and thereby changed from a green and picturesque valley, one of the scenic wonders of the state, to a gray, scarred waste. At every season of the year the Notch has its peculiar beauty. As a travelled pass into the mountain country it is worth much to the state of New Hampshire. As the source of the Saco it means much to industry; but it is one of the striking examples of mountain sides that can never have their forest growth restored if they are once laid bare.

There is another side to the question. Neighbor states have been fighting New Hampshire's battle for national preservation of the chief watersheds of the White Mountains. The battle has been won, but it was hardly won, and the fruits of it are by no means certain. It has been conceded that New Hampshire is not a wealthy state and could not handle this whole project alone; but it has not been conceded that New Hampshire with its nominal debt is poverty stricken or helpless. The new national forest bill as passed is a general bill and New Hampshire can only have its share by deserving it. If the state will not help itself when its interests are so plainly at stake there will be slight inclination on the part of the national authorities to come to its assistance. And there will be no lack of applicants for the few million

dollars provided for in the new forest law just passed. There is a plain duty before the state of New Hampshire. This duty is to save the Crawford Notch to be the permanent possession of the people of the state and thereafter to secure such other of its mountain forest tracts as would not naturally be included in the national holdings and are especially indicated as the property of the state. In this way only can the full value of the new national forest law be secured. It is not contemplated by any one that all the lands that must be public forest reservations should be owned by the national government. It is proposed that the national government should hold the great interstate watersheds of navigable rivers and that this should be a nucleus for state and private holdings which may be under the same or similar forest administration and protection. The friends of New Hampshire who have worked early and late for many years past to secure through the nation the protection that was desired, look to the state to prove by its own actions that it deserves the interest that has been lavishly given to it.

CURRENT LITERATURE

REVIEWS

The Mississippi River and its Wonderful Valley. By Julius Chambers, Fellow of the Royal Geographic Society, Member of the National Geographic Society. With 80 illustrations and maps. pp. xvi, 308. G. P. Putnam's Sons, New York and London, 1910.

Mr. Chambers has made in this volume on the "Father of Waters" an interesting addition to the handsome Putnam series on American waterways. The human and historic sides of the great river's life interest the author especially, and there is slight discussion of physical conditions, or engineering, waterpower, and transportation problems. Reviewing briefly the early conjectural period of Mississippi River discovery, the work of De Soto, and the much more extensive and fruitful French explorations, the author comes down to the days of the English and Americans, the Louisiana purchase, and the early explorations to discover the somewhat elusive source of the river. The most interesting part of the volume is the chapters given to an account of the author's own explorations, undertaken in 1872, to complete the reconnaissance carried on by Schoolcraft in 1832, and Nicollet in 1836, resulting in the discovery of Elk Lake. After this exploration the author went by canoe to Saint Louis, and then by steamboat to New Orleans. There is a chapter on the delta and a brief one on "The Age of Water," after which the author turns to the modern history of the river. Were any criticism to be made of this entertaining volume it would be that there is a lack of continuity in the narrative, and too frequent interjection of irrelevant matters.

The Cost of Growing Timber. By R. S. Kellogg, Secretary Northern Hemlock and Hardwood Manufacturers' Association, and E. A. Ziegler, Director Pennsylvania State Forest Academy. American Lumberman, Chicago, 1911.

This interesting and practical pamphlet is a development of a paper prepared by the authors and presented at the seventh annual meeting of the National Lumber Manufacturers' Association, in Seattle in July of 1909. The discussion occasioned by the paper and subsequent study of the subject led them to revise the original manuscript, and publish it in its present form in the belief that its principles are sound and will help toward a clearer conception of the conditions which must be established in the United States if forest conservation is to be a reality. The key to the discussion may be found in a sentence in the introduction: "The permanent timber supply will not be maintained by private effort at less than the cost of production." The object of the pamphlet is to present a method of analysis of the elements of cost of growing timber. These, the authors say, are five: (1) the value of the land; (2) the stocking of it with young trees; (3) the administration of the operation, and the protection of the growing timber; (4) the taxes; (5) the rate of interest. These elements are then discussed in general, following which detailed studies are made of the yield of certain trees. The trees chosen are the white pine, the loblolly pine, the long-leaf pine, red oak, and Douglas fir. The authors then draw certain general conclusions as to the profitableness of the production of the species examined. An appendix contains some cost tables which will be serviceable in making computations.

As a beginning of a study of a most important subject, this pamphlet is practical, suggestive, and will well repay careful examination by everyone interested in the production of timber.

Handbook of Conservation. By Mrs. Fred H. Tucker, Chairman of the Conservation Department, Massachusetts State Federation of Women's Clubs, pp. viii, 911. Boston, 1911.

This little handbook, a kind of syllabus and note-book, is the result of painstaking work by the able chairman of the conservation department of the Massachusetts State Federation of Women's Clubs. Very few women have given more years of careful and really scientific study to the subject of forestry and conservation than Mrs. Tucker. This handbook, she says, has two objects. First, to present an orderly series of suggestive topics upon the conservation of our natural resources, and second to furnish explanatory comments upon the various phases of the subject. The topics are intended as a guide to study and may be used as headings for papers, assignments for class work, or merely as a convenient analysis for the general reader to keep in mind the salient points and the logical development of the subject. The comment is largely in the form of quotations from well-known experts or practical men of affairs. The book was prepared especially for the use of women's clubs, but all students of conservation subjects will find it serviceable. The author explains that no attempt has been made to preserve due proportion among the parts. It has been the aim to elaborate some phases at the expense of others. There is a general outline of the conservation of our natural resources, and then chapters are devoted to ores and minerals, to lands and soils, to waters, to forests, to the ownership and control of natural resources, to birds, and to shade trees. There are two final chapters, one containing practical suggestions, and one a bibliography. The work in this handbook is well done. It is what it claims to be,—highly suggestive and useful as an elementary guide. We heartily recommend it to lay students of forestry and conservation subjects.

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NATIONAL FOREST WORK

Plans for Buying Eastern Forest Land

The National Forest Reservation Commission, provided for under the new forest law, is made up as follows: J. M. Dickinson, secretary of war; Walter L. Fisher, secretary of the interior; James Wilson, secretary of agriculture; J. H. Gallinger, senator from New Hampshire; J. W. Smith, senator from Maryland; W. C. Hawley, representative from Oregon; and Gordon Lee, representative from Georgia.

The Department of Agriculture announces, through a circular which is just published its plans for the purchase of land by the National Forest Reservation Commission created under the new Weeks forest law.

This law, as our readers know, was passed with special reference to the creation of national forests in the Appalachian and White Mountains. Under it the Secretary of Agriculture is to examine, locate, and recommend to the Commission for purchase such lands as in his judgment may be necessary for regulating the flow of navigable streams. The circular, which is now being printed, is intended to give information to the public as to where and what kinds of land are wanted. Owners of land, the purchase of which will be considered by the government, are expected on the basis of this information to make known to the Forest Service, which will conduct the work for the Department of Agriculture, their desire to sell. Copies of the circulars may be obtained by applying to the Forest Service.

The law is not restricted to particular regions, except that lands may be bought only in the states whose legislatures have consented to the acquisition of land by the United States for the purpose of preserving the navigability of streams. The states which have already taken the necessary action are Maine, New Hampshire, Maryland, Virginia, West Virginia, North Carolina, Tennessee, South Carolina, and Georgia.

The first lands to be examined for purchase will be in the southern Appalachian and White Mountains, which, because of their altitude, steepness, and lack of protection, are in a class by themselves. The area which is believed to need protection is much larger than the government can purchase. Much difference exists, however, between different parts of the region. Careful examinations, which have been going

on for the last ten years, have proved that the conditions which affect stream-flow to an extreme extent are to be found in relatively limited areas, which are scattered more or less widely. By careful selection it is believed that much can be done for the permanent improvement of the watersheds with the purchase of a relatively small part of the land.

A blank form for the offer of land accompanies the circular. Additional copies of this blank form may be had by writing the Forest Service at Washington. The kinds of land which will be considered for purchase, if they lie within the designated areas, are set forth by the circular as follows:

Timbered lands may be bought either with the timber standing on them or with reservation by the owner of the right to cut the timber under certain rules to provide for perpetuation of the forest. These rules will form a part of the agreement for purchase of the land. Since, however, the government cannot pay high prices, it is not regarded as probable that much land bearing a heavy stand of merchantable timber can be bought. Culled and cut-over lands may be bought, as well as land covered with brush which is useful for watershed protection, burned land, and abandoned farm land, whether cleared or partially, or wholly covered by young timber growth. Good agricultural lands will not be considered. Owners may reserve the right to remove valuable mineral deposits which are known to exist.

Proposals will be received for small as well as for large tracts, although small tracts can be examined only where the purchase of a considerable total of land in the same neighborhood is under consideration. With regard to the price which can be paid, Secretary Wilson indicates that the policy of the Commission will be to make the money available go as far as possible. "For the most part," he says, "we shall have to buy cut-over lands or lands without much merchantable timber. I want to make it plain at the start that I shall recommend this class of land only when it is offered very cheap. Proffers of land at exorbitant prices will not be considered. I am frank to say that I hope to see a great deal of public spirit manifested by land owners. I expect some lands to be offered at merely nominal prices, in order to aid the government in getting

well started upon this wise and necessary policy.

"The lands acquired by the government will be held as national forests. They will be protected from fire and the growth of the timber will be improved as much as possible. The lands will not be game preserves, but will continue to be open to the public for hunting and fishing in accordance with the laws of the state in which they are situated. All their resources will be available for the public under reasonable conditions. Another point which I wish to emphasize is that we are not going to take from people their homes in order to put the lands into national forests."

The areas within which offers of land are desired are set forth in detail in the circular of the Forest Service. The approximate location of these areas is as follows, although Secretary Wilson warns those wishing to offer land that they should first secure the circular in order to see whether their holdings fall within the more detailed areas therein indicated:

In New Hampshire, lands in the White Mountains region.

In Maine, lands in a portion of Batchelder's Grant in Oxford County.

In Maryland, a portion of the western part of Garrett County.

In Virginia, parts of Shenandoah, Rockingham, southwestern Warren, western Page, northern Bedford, eastern Botetourt, southern Rockbridge, southern Washington, Smyth, and Wythe counties, and western Grayson County.

In West Virginia, parts of Pendleton, Hardy, Randolph, and Pocahontas counties.

In Tennessee, parts of northeastern Johnson County, Cocke, Sevier, Blount, and Monroe counties.

In North Carolina, parts of Wilkes, Caldwell, Watauga, Buncombe, Yancey, McDowell, southwestern Mitchell, Haywood, Swain, Jackson, Henderson, Transylvania, Macon, Clay, Cherokee, and Graham counties.

In South Carolina, a part of Oconee County.

In Georgia, parts of Rabun, Habersham, and White counties.

New Grazing Regulations

The Secretary of Agriculture has approved a revised form of the grazing regulations, which govern the use of national forest ranges. The most important departures from the old regulations are found, first, in the fact that provision is made for recognition of a permanent national advisory board representing the sheep and cattle interests, which will confer an-

nually with the Secretary of Agriculture concerning grazing matters; and secondly, in the laying down of a rule that on forests where the quality of range and advantages for raising cattle and sheep are equal, the yearlong rate for sheep after the season of 1911 will be thirty per cent of the yearlong rate for cattle.

The new regulations have been made the subject of extended and most careful consideration, and are promulgated at the present time as the result of a general revision made of all the regulations governing the use of the national forests. Before deciding on the grazing regulations, Secretary Wilson invited representatives of the two national organizations of stockmen, the National Wool Growers' Association and the American National Live Stock Association, to present their views to him on grazing matters, and to make any suggestions which they might wish to offer concerning the proposed regulations. The proposed regulations, as they had been drafted by the Forest Service, were submitted to delegates of the two associations, who came to Washington in response to the Secretary's invitation. Secretary Wilson recognizes that the one and one-half million cattle and seven and one-half million sheep, which are annually grazed on the forests, bear an important relation to the price of beef and mutton in this country, and that the public need of increased food supplies no less than the best interests of the stock industry call for careful methods of regulation to promote the full use of the grazing resource.

Regulated grazing on the national forests seeks not only to make available, to the fullest degree consistent with proper protection of the range itself and of forest growth and streamflow conditions, the annual forage crop, but also to allot the grazing privilege equitably. By giving the stockmen themselves a chance to be heard with regard to the rules established, and by securing their help in the adjustment of disputes between claimants for use of the range, the department officials consider that the task of administering the range satisfactorily has been made much easier.

No radical changes in the regulations have been made. As a result of the conferences with the representatives of the stockmen's associations, a number of changes were made in the details concerning the conditions under which owners may surrender, transfer, or renew application for grazing privileges. Both the department and the stockmen are anxious to prevent speculation in grazing privileges, and suggestions for minor modifications of the rules, offered by the stockmen to this end, were readily accepted.

STATE WORK

Report of the Forest Commission of Maine

In his annual report Edgar E. Ring, forest commissioner of Maine, refers to the fire peril and to the lessons of the past season. Of the new Maine forest fire law, he says:

"The forest fire law enacted by the last Legislature was a long step toward the conservation of our forests by protecting them from fire. We know the principles of the law are correct because we have tried them out. The necessity of patrol is so generally admitted that it hardly needs mentioning. Putting out fires already started is better than letting them burn, but, as the real foundation of a protective system, it is about like lowering the lifeboat after the ship has struck. Patrol is better than fighting, because the incipient spark or camp fire can be extinguished before it becomes a forest fire that has to be fought. One patrolman can stop a hundred incipient fires cheaper than one hundred men can stop one large fire.

"Results in forest protection are most truly measured, not by the number of fires extinguished, but by the absence of fires at all.

"Another feature of the new law is that the small assessment upon the land owners makes it co-operative. Just as the individual cannot maintain a properly organized and equipped fire department to look after his city property as well alone as through joining with the community, neither can he do so in protecting forest property. If one patrolman can cover the land of several owners, it is unwise for each to hire a man. If a fire starts and threatens several tracts, it is better to share the expense of putting it out. The sale value of timberland in any region is increased by public knowledge that those interested there unite in supporting progressive protective methods.

"Again this law has been the means of compelling the non-resident owner, the small owner who is unable to employ any one alone, and the non-progressive owners who would otherwise do nothing, to contribute their share toward the general cost, and the public take far more kindly to the enforcement of fire laws by the state than to similar activity on the part of the individual owner, against whom a prejudice might exist.

"Our forest wealth is mainly community wealth. All the owner can get out of them is the stumpage value. The people get

everything else. On every acre of land destroyed by fire the citizens of this state who are not land owners bear at least 75 per cent of the direct loss and sustain serious injury to their future safety and profits.

The forest district plan, recently provided for, by which the land owners of Aroostook, Franklin, Hancock, Oxford, Penobscot, Piscataquis, Somerset and Washington counties are annually assessed one and one-half mills (in 1909 and 1910, \$63,945.44) for fire patrols, has the commissioner's hearty approval.

Concerning the fire patrol and lookout system, Mr. Ring says: "One of the first things attempted and carried out under the conditions made possible by creating the Maine Forestry District, was the enlargement of the patrol and lookout systems.

"Eight years ago when the first law was passed looking to the protection of Maine's forests a goodly number of fire wardens were appointed and so far as possible during the dry and dangerous periods the most exposed places were patrolled, but necessarily only a limited amount of such work could be done with an appropriation of only \$10,000, which had to be devoted to extinguishment as well as prevention.

"Experience has taught all who have made a study of the protection of forests against fire that first in importance is the protection that can be gained by proper patrol. It has been the custom of the forest commissioner each spring to meet the land owners of the different sections of the state at some convenient and central point to talk over and plan the season's work. At the meeting held in 1909 after the passage of the Maine Forestry District act we made known our plans for extending the patrol system and such plans met with hearty approval of the land owners.

"An efficient corps of chief wardens were appointed, men being selected who were recommended by the land owners as being thoroughly familiar with the territory assigned to their care. Under the chiefs were placed enough men to cover the most exposed sections and there was not a township of wild land that was not included in the routes of the patrolmen. The waterways and roads most frequently traveled by rivermen and sportsmen were particularly well looked after as were the townships lying along the railroads.

"Of the amount appropriated in 1909 there was used in the patrol system alone, including amounts paid the chief and

deputy wardens the sum of \$31,131.79, making more than one-half of the entire amount expended in 1909 going directly for patrol work and supervision of the same. In 1910 for the same class of service there has been expended up to November 1, \$38,708.97. Included in the work of patrol and constant watch for fires there has been posted by these men over 20,000 danger-fire notices, printed largely in English, although when it seemed wise notices printed in French and Italian have been put up.

"Close touch with the men employed has been made possible by weekly reports returned to the department by the regular patrolmen.

"In case of fire of any proportion and causing the hiring of extra men the chief or deputy wardens in charge file reports containing the following facts: County and township in which fire occurred; time discovered and number of hours before it was entirely extinguished; direction of wind at the time; method employed in extinguishing same; cause of fire; area burned; estimated damage; names of men and hours employed and the total expense of extinguishing the fire; the report to be signed and sworn by the warden in charge and approved by the chief warden of the section in which the fire occurred."

According to the report fire losses in incorporated towns in 1909 amounted to \$32,965, in unincorporated townships, \$63,734. The loss from forest fires in incorporated towns in 1910 was \$1,906 and in unincorporated townships \$935. The year 1909, the first season under the Forestry District, the appropriation for prevention and extinguishment was about \$64,000 and the selectmen of towns also worked under the new law making their municipalities liable for their negligence.

The forestry department has equipped its wardens with tools for fighting fires, which are distributed in convenient localities and are branded with the stamp of the district. The amount invested in this manner is \$5,000. There are twenty-four lookout stations on the high elevations. The construction and equipment of these stations has cost \$14,664.49 the past two years. In connection with these stations many lines of telephone have been constructed, bringing the most remote sections into quick communication with the chief warden and localities from which help can be easily secured.

By arrangement with E. C. Hirst, state forester of New Hampshire, a system of co-operation was entered into in 1910 whereby Maine gets the benefit of the Kearsarge Mountain station in Chatham, N. H. Other stations overlooking Maine forests are contemplated by New Hampshire. In return Maine wardens watch for fires in

New Hampshire from the Aziscoos Mountain station in Lincoln plantation, Oxford county. A system of reversing telephone tolls distributes the expense equitably.

A Gift to Vermont

Vermont has just received a gift of 106 acres including the summit of Bromley Mountain in the township of Peru, elevation 3,260 feet, from Hon. M. J. Hapgood. Mr. Hapgood has long been interested in forestry, and in addition to this gift has placed his own holdings under the direction of the state forester.

Commissioner Conklin's Report in Pennsylvania

In his annual report Commissioner of Forestry Conklin of Pennsylvania says:

"It is the duty of a government to perpetuate itself, and in perpetuating itself there is a further duty to provide for the common welfare of its citizens. With these objects in view, it is wise for a state to see to it that every square foot of soil, the source of wealth, be made to produce its highest revenue. Whenever elements of production are allowed to be wasted, the whole moral fiber of those in connection with the waste is lowered and general dissatisfaction follows. The state in turn suffers from undesirable citizens, loss of industry, income, and at the same time, outlay for remedial measures and a host of economic conditions which can hardly be followed.

"There must be more co-operation on the part of the departments concerned, principally those of education, agriculture and forestry. School gardens, elementary agriculture, agricultural clubs, Arbor day and so on must be gotten into the schools. The school building should be the social centers of the communities and, if necessary, the government must send out social settlement workers. Agriculture and forestry must no longer be left out of county and local teachers' institutes, nor should a consideration of the schools and forestry be left out of farmers' institutes. There are no forestry institutes, but lectures, bulletins, sample plantings and all manner of assistance must be provided for. It behooves every member of our departments to make each appropriation reach as far as possible, but it is more important that results are obtained from what is done, and then the results themselves must and will speak for increased assistance from the legislature.

There have been added to the reserve area 17,000 acres, during the past year, making the total area of reserves now owned by the state 933,582 acres. There are thirty-nine trained foresters and eighty-

five rangers in charge of this large area, using every means available to develop it as rapidly as possible and to bring it up to the best economic production.

The Oregon Conservation Commission on Forests

Oregon has had a particularly able and clear-headed conservation commission. This body issued for 1910 a comprehensive and valuable report. The commission has recently resigned to relieve Governor West of any embarrassment, and because of the failure of an appropriation to carry on the commission's work. The Governor declares that the state is to have a conservation commission, and he may reappoint some or all of the old board—J. N. Teal, chairman; F. G. Young, secretary; J. B. Wilson, C. B. Watson, Frank J. Miller, J. N. Hart, J. C. Stevens. The section of the report of the commission devoted to forests deserves wide reading for its fair and temperate discussion of current forest problems of the Northwest. We print this section entire:

FORESTS.

Whether considered as a source of greatest direct revenue shared by all the people, or for their part in maintaining conditions favorable to the highest general development along all industrial and social line, Oregon's forests, next to land itself, are far her most important natural resources. No other represents equal potential wealth; any other could be spared with less injury to present and future prosperity.

We are supposed to have a fifth of the merchantable timber in the United States. Even at current prices it should bring us \$5,000,000,000.00. This prodigious wealth is better than gold, for its production will employ an industrial army, afford market for our other commodities, and in every way tend to the development of a great prosperous commonwealth. Forest wealth is community wealth. Protection of forest industry is the best form of prosperity insurance a timbered state can buy.

Notwithstanding these facts, Oregon is far behind other timber states in forest protection and management. While other states with far less at stake, from Maine in the extreme east to Washington and California on either side of us, are continually improving their forest laws and appropriating more and more liberally to safeguard the community welfare. Oregon does practically nothing. With an excellent code of forest laws, as far as punitive and regulative provisions go, it provides no machinery for their enforcement.

The result is what might be expected. The Federal Government and private forest owners, where they are interested, do much to prevent and fight fires. But without

state aid neither can enforce the laws that would prevent fires, and large areas do not even profit by even their hand-capped effort. During the season just closed we have lost, by fire alone, timber which if saved for manufacture would have brought \$23,000,000.00 into Oregon. Other property worth many thousands of dollars has been lost by settlers who could ill afford it, many human lives have been sacrificed, and untold though usually unrealized injury has been done to the thousands of acres of second growth which otherwise would have made the forest of the future. Little or no progress in reforestation to retrieve this injury is possible under existing conditions.

All of it is unnecessary, for forest destruction is preventable. The state is directly responsible. Its responsibility and the remedy which lies in its hands are set forth in the following pages.

OUR FOREST RESOURCES.

While an accurate census is still lacking, authorities generally agree that Oregon has approximately four hundred billion feet, B.M. of merchantable timber. This estimate is probably conservative, for standards of merchantability become less exacting and vast quantities of wood material now unconsidered will have future value. The government estimates that about one hundred and thirty-five billion, or approximately a third of the total, is in national forests. The other two-thirds, the most valuable and accessible, are mostly in private hands. The state itself owns comparatively little timber, having disposed of most of its educational grant lands.

Board foot figures, however, fail to convey any adequate idea of the tremendous economic importance of this resource. We are further prevented from realizing it because its exploitation has scarcely commenced. We regard our forests largely as a wilderness, or at most as a speculative asset for their owners, instead of computing their function in the early future as producers of community wealth. But the world's demand for timber must inevitably lead to the manufacture and shipment of most of this material within the next fifty years, thus bringing billions of dollars into Oregon. For this reason probably no other resources can approach our forests in distributing new wealth per capita among our population and consequently in upbuilding every industry we have, or may hope to have in any portion of the state.

Without counting increasing export to other countries, the United States already uses (1908) 40,000,000,000 feet of lumber a year, besides 118,000,000 hewn ties, 1,500,000,000 staves, over 133,000,000 sets of heading, nearly 500,000,000 barrel hoops, 3,000,000 cords of native pulp wood, 165,000,000

cubic feet of mine timbers, 1,250,000 cords of wood for distillation, and 90,000,000 cords of fire wood. One by one the timber states, which have met this enormous drain, are becoming exhausted. Washington now bears the heaviest burden, but Oregon will soon be called upon.

But, while Oregon's stock of four hundred billion is almost incalculably valuable in the light of these figures, it is scarcely more so than our immense area of cut and burned over land. Upon our management of this depends whether we shall continue the period of prosperity permanently. Here again accurate figures are lacking, but it is probable that an area quarter as great as that now bearing merchantable forest is capable of equal production in the comparatively early future. This fact, practically ignored, is of the utmost importance.

Nowhere else is forest reproduction as rapid and certain as in the Pacific Northwest. The same natural influences which made our existing forests the most magnificent in the world will perpetuate them with equal success if given slight co-operation by man; indeed they ask little help but prevention of fire. Saw timber can be grown in 40 to 60 years; ties, timbers and piles in less. It is reasonable to suppose that while the quality may be inferior to that of the old forest being used now, timber scarcity will make a second crop equally profitable per acre in 60 years. Our deforested land of today should bring us in a billion dollars within the lifetime of our boys and girls, if we do not deliberately destroy its capability to do so.

RELATION OF FORESTS TO THE AVERAGE CITIZEN.

The Oregon lumber industry nows brings about \$25,000,000 a year into the State; as much as our apples, fish, wool, and wheat together. In a year or two our forest revenue should certainly equal or surpass that of Washington, already over \$75,000,000. Eighty per cent of this immense sum goes to pay for labor and supplies. Practically all finds its way into general circulation. The lumber industry is like any branch of manufacturing in that it creates business, and more than most it consists of labor and so supports every industry of the community. The money brought into Oregon by lumbering is the greatest source of revenue to laborer, farmer, merchant, and professional man. As the product is mostly sold elsewhere, this revenue is clear gain to the state. Forest products constitute eighty per cent of the freight shipped out of Oregon.

The interest of the average citizen in forest protection and use is affected very little by the passage of title to forest land. The owner gets only the stumpage, which is

a small part of the value. The people get everything else. Moreover, the people of Oregon are also consumers of forest products. Waste of existing forest, or failure to produce new forests, adds inevitably to the price they must pay, besides reducing the per capita wealth with which to pay it. And the price of almost every other commodity we use is affected by the cost of forest material used directly or indirectly in its manufacture and marketing.

It is unnecessary here to point out the relation of forests to stream flow and the imperative necessity of protecting our agriculture and water power industries from alternating flood and failure. Less commonly considered is the intimate relation to every citizen, the farmer especially, of forests as a source of tax revenue. This form of property is one of the chief contributors to the support of local and State government. Every acre of timber destroyed, or failing to grow where it might grow, adds to the tax burden of the holders of other property. Were all Oregon's timber to be destroyed, this burden would suddenly be augmented. Partial destruction has precisely the same effect in corresponding degree and so does failure to reforest.

Oregon's forests are the assets of all its citizens. The lumberman or timber owner is, economically, only their agent in using them. The lumberman can change or move his business, but the people as a whole have a stake in forest preservation that is unalienable and paramount. Their prosperity depends upon it now and always. The question involved is not one of personal property, but one of a community resource.

PRESENT WASTE.

Blinded by the fallacy that it is the timber owner who pays, we let nearly one and three-quarters billion feet of timber burn this year without having taken any steps to prevent it. If saved for manufacture this would have brought at least \$23,000,000 into Oregon, or over \$30 for every man, woman and child in the state. This sum would pay the entire cost of state government for nearly ten years. It would pay every dollar of state and county tax together in Oregon with money to spare for improvements. The interest on it at only one per cent for one year, if spent for systematic protection, would have prevented the loss.

In addition to the loss of merchantable timber six human lives were sacrificed and the destruction of buildings and improvements amounted to many thousands of dollars. Property losses by citizens, in no way connected with the timber industry, were many times what it would have cost to prevent these fires. Thousands of acres of cutover lands were also burned over,

destroying all reproduction and seed trees.

Only a fortunate break in weather conditions prevented an even more serious catastrophe. All available agencies were taxed to the utmost fighting fires already under way, and had rain not come when it did countless others would have passed beyond control. Oregon's escape from one of the most fearful forest fires of history was not due to its own precaution.

Nor, after all, was the season of 1910 so unusual as to be reassuring as to the future. Seasons vary, and Oregon has no adequate system of reporting fire damage, but competent authorities estimate that the average annual loss in the past has been fully half a billion feet and probably more. This means an annual loss to the community of six or seven million dollars at least.

Second, only to the fire loss, as a result of Oregon's apathy toward forest preservation, is its unfavorable affect upon reforestation. To the careless waste of existing resources which we and our families should share, we add the idleness of all the land cut and burned over each year, a dead loss of many millions of dollars. Fear of fire and discouraging taxation justly warrants the owner in not taking the necessary steps to make this land useful, hence much of it reburns and turns into desert, ultimately to be untaxable, non-productive, and offering no reward to labor.

Milling and logging waste constitute another leak in our forest economy and will persist as long as neither state nor public show any recognition of fundamental principles. So long as our lumbermen must bear the entire burden of forest preservation and still compete with those of other states where the community assists, they can do only what it pays to do.

EXISTING PROTECTIVE EFFORT.

The federal Forest Service is the only public agency doing anything to take care of the Oregon forests. Its expenditures for protection alone in 1910 will exceed \$200,000. Of this approximately half is for patrol and half for trail and telephone building and additional fire fighting labor. The U. S. Army and the Oregon National Guard also gave valuable assistance during the August fires, but this was an unprecedented emergency action and can hardly be considered in discussing Oregon's protective system. Ordinarily the Forest Service confines its work to the national forests, but this year the menace to homes and property outside led it to disregard official boundaries in many instances. In either case the benefit accrues to the state for national forest timber is a state asset in all but stumpage returns and twenty-five per cent of these also are paid to the counties. As adequately as congressional appropriations permit, the Forest Service

takes care of about a third of the timber in the state. It has also begun reforestation.

The only fire protection is that given by private timber owners. Through individual and co-operative patrols they spent about \$50,000 in 1909 and, while reports for 1910 have not been prepared, presumably that amount was doubled or trebled this year. About 290 regular patrolmen and over 1,000 extra fire fighters were employed. The Coos County Fire Patrol Association and the Klamath Lake Counties Forest Fire Association are strongly organized co-operative patrols in which the members pro rate the cost upon their acreage. The Northwest Oregon, North Willamette, Lincoln-Benton and Polk-Yamhill Forest Fire Associations are looser alliances of timber owners maintaining individual or informally co-operative patrols. For central effort in increasing the extent and efficiency of patrol, all these organizations combine in the Oregon Forest Fire Association, which in turn is affiliated with the Western Forestry and Conservation Association embracing all similar organizations from Montana to California. These private patrols have been of immense value to the State. It is notable that where they were best organized, losses this year were insignificant. They vary in efficiency, however, and do not cover sufficient area.

The Oregon Conservation Association represents a purely public spirited reform movement, supported by annual dues from all classes of citizens, and not particularly pledged to promote forest protection more than that of other resources. So far it has devoted itself chiefly to this end, however, in the belief that no other problem is equally urgent. Its chief function has been to supply means for carrying on the work of the State Board of Forestry, which is unprovided for by the state itself. By meeting expenses for postage and clerical work, and allowing its secretary to act as secretary of the state board in preparing publicity matter concerning the fire evil, appointing and aiding voluntary State fire wardens, collecting statistics, etc., it alone has prevented the forest laws from being absolutely inoperative. It is hardly likely, however, that it can continue this work indefinitely, in view of the claims of its members interested in other lines of conservation. The Western Forestry and Conservation Association, mentioned on a preceding page, is even more active in propaganda work seeking to interest both general public and forest owners in systematic forest protection.

The State Board of Forestry, created in 1907 by a statute that also provided an excellent forest code, remains practically powerless because it is not supplied with any machinery for active work. It is thus shorn of any real function except to make recommendations to the legis-

lature and has not the means of collecting information to make these effective. Its appropriation in only \$250 a year. This insignificant sum is Oregon's total contribution, as a state, to the cause of forest preservation. It is the least appropriated by any state in the Union that has any forest system at all.

The statute referred to (Chapter 131, Session Laws of 1907) has three excellent features. In the principle of a non-political Board of Forestry, composed mainly of representatives of agencies, competent to deal with forest matters, it follows the example of most progressive states. By enabling the authorization of voluntary fire wardens to control the use of fire in the dry season, it provides the only safeguard practicable without actual state aid. Its regulative and punitive sections, or "fire laws," are well drawn as far as they do. On the other hand, it is only framework, lacking the life to make it really effective. It provides for no educational work to create the necessary public undertaking of the subject, no means of investigating forest conditions, no means of enforcing the fire laws, no machinery for actual forest protection, and above all, no head to develop and execute any State forest policy. In effect it amounts to giving in legal language the state's gracious permission to its forests to take care of themselves. This authority is of considerable use, for without it still less would be accomplished, but it is only the first step toward meeting a situation in which the state's welfare is vitally concerned and in which the state is primarily and unavoidably responsible.

That the state's present policy, or rather lack of policy, is hopelessly inadequate may be seen in the following counts:

1. There is no one to enforce the fire laws. Every other law to protect life and property has its provided officers. The fire laws do not lend themselves well to the ordinary established machinery, but are not for that reason any less entitled to respect. There is no moral or economic difference between firing a forest and firing a city, yet to violate one excites horror and leads to the penitentiary, while conviction, or even prosecution, for the other is almost unknown. If detection is more difficult, there is all the more reason for providing for it. This is a police function and only the state can exercise it. The employee of an individual or corporation can patrol or fight fire, but he cannot successfully exert police power or prosecute. At present violation of the fire laws is the rule. The violator cannot be expected to take in earnest a law which the state itself does not recognize. With the laws enforced, few fires would start.

2. There is no means of stopping fires that do start. Forest protection is left absolutely to the enterprise, judgment and

financial responsibility of anyone or no one. To the extent that he believes it pays him to do so and where he believes it pays him to do so, the forest owner will do his part. But this is exactly like not policing a city in the hope that some individual will be willing and able to do it to our satisfaction. And the result corresponds. Those who can least afford to lose receive least protection.

3. There is no means of helping the progressive timber owners to secure the co-operation of their unprogressive brothers. Probably the greatest retarder of efficient private organization which would otherwise reduce the need of state financial aid to the minimum is the failure of the unrepresentative minority owners to bear their share.

4. There is no one to educate the public in the need of forest preservation. So long as this work is left to private effort it is not only uncertain in quantity and persistence, but accomplishes the minimum result because suspected of selfish motive. By not recognizing this need, the state in effect declares it non-existent and advocates forest waste.

5. There is no one to study and promulgate improved methods of protection, management and reforestation. Even the interest in forestry, which is growing, without propaganda is unable to get the technical information and assistance necessary to secure actual practice.

6. There is no progress toward a solution of the forest taxation problem, especially as regards cut-over lands, without which there will be continual dissatisfaction on all sides and small progress toward reforestation.

7. Above all, there is no agency with facilities and technical competence to develop, to say nothing of executing, a rational far-seeing forest policy for the state which needs this more than any in the Union.

To sum up, although Oregon is trying to bring about wise use of its fish, its game, and its agricultural resources, and spends money to this end, it absolutely neglects its most vulnerable resource—its forests.

WHAT IS NEEDED AT ONCE.

On the other hand, it needs no theory to outline a remedy. We have only to look at experience elsewhere. Where there is an adequate fire service the losses are reduced by a hundred times its cost and few fires are set. Where there is someone to study and report conditions, the laws are constantly improved. Where good laws are strictly but intelligently enforced, the people respect and endorse them. Where the lumberman can get competent advice and encouragement, he is quick to see that both protection and reforestation are profitable. The essentials of such a policy for

Oregon are cheap and simple. They are as follows and should be provided for without delay.

1. A trained state forester familiar with western conditions and experienced in organization for the prevention of forest fires. He should not be a cheap man, but the best available, and chosen absolutely independently of politics. He should be allowed to appoint one or more assistants.

2. A liberal appropriation for forest fire patrol, with ample latitude for such co-operation with other agencies as the state forester shall find for the best interest of the public, especially through the encouragement of further extension and efficiency of private and county effort.

3. Improvement and strict enforcement of laws against fire, the state to exert its police authority to this end.

4. Systematic study of forest conditions and needs, to afford basis of intelligent action and of any further desirable legislation.

5. A system of general popular education, with specific advice to individuals in proper forest management.

The following are equally important as part of an early rational policy but perhaps less urgently in need of immediate action by the legislature:

1. Dependable low taxation of deforested land not more valuable for agriculture which will encourage its being held and protected for a future crop, the state to be compensated by adequate tax upon the yield.

2. Thorough study of the subject of taxing mature timber, with a view of securing the adoption of a system which will result in the greatest permanent community good.

3. Study on which to base the early application of advanced forestry principles to the management of state-owned forest lands, and the purchase of cut or burned over lands better suited for state than private forestry. This to furnish educative example as well as to maintain state revenue and proper forest conditions.

LESSONS FROM OTHER STATES.

Hardly any two states have exactly the same policy in fire prevention. But, barring, of course, those which do practically nothing and consequently cannot be considered to have studied the subject, the greatest divergence is in the manner of making the work a public charge after admitting that it should be one. In other words, progressive states recognize that it is a public function and seek to make the general population share the cost, but their customs of local government influence decision as to whether state, county or township should collect and expend the funds which are borne by the taxpayer in either case. This is largely a question

of constitutional power to lay burdens upon local units against their will.

Pennsylvania, which in all forestry work makes the state chiefly responsible, bears four-fifths the entire expense by direct appropriation. The counties pay the other fifth. Michigan pays one-third, Connecticut one-fourth. The majority of eastern states, however, share costs equally with the town governments which exist there. Vermont solves the problem by assuming it should be a town charge but preventing hardship upon poor towns by providing that any expense in excess of five per cent of the town's "grand list" shall be borne by the state. In 1908 this worked out to make 70 towns with small fires pay their own bills, while in 20 towns, severely ravaged, the state bore two-thirds the expense, of fire fighting at a cost to it of \$6,000. Some states, including Massachusetts and Wisconsin, make the towns bear all fire expense except on state reserves. Maine places a special one and one-half mill tax on all property in (not timber land alone) the forest portion of the state, and the state collects and spends it. As a rule eastern and central states do not consider private protection by the owner any more logical than private fire protection in cities. To put it another way, they assume the forest tax payer entitled to the same protection under the forest statutes that he or any other citizen receives under the statutes against murder, theft or arson. The question is only whether state or local government shall finance and provide it, by direct appropriation or otherwise.

Oregon conditions are different in many ways. The people's interest in forest protection is in no way decreased by the existence of larger individual holdings, for the use of timber brings the same wealth for distribution and its destruction equally injures all industries. Indeed the public's stake is greater in exactly the measure that forests constitute a greater proportion of our total resources. Nevertheless, the system of production must be modified to fit our constitution, our distribution of wealth and population and our less advanced public sentiment in the matter. Axiomatically, Oregon should spend as much more money than Pennsylvania, as it has more forest values to protect, but spend it differently.

No project, in which the public does not share, receives public support. So long as forest preservation is by the lumber industry alone, it is looked at as a measure of private profit only. Carelessness and lawlessness cannot be prevented or prosecuted, for public sentiment is not with the property owner. But, when the average citizen is made to pay something to protect his own welfare, he wants results for his money, even if he does not approve of paying it. He sees that de-

crease of fire hazard decreases his share of the expense.

Town or county responsibility for actually performing work cannot be relied on at our present stage of popular education. Politics, inexperience, apathy, are twenty times as hard to overcome in twenty units of government as they are in one. Theoretically, the nearer the administration is to the thing administered the better, but this is true only when equal competency and interest exists. This is borne out by results where the experiment has been tried, as in California. There the law authorizes counties to appropriate for fire prevention, but they do almost nothing. The only way this plan could be made effective is by compelling the counties to act.

Our wealth, population, and dependent industries which should help pay for forest protection are largely outside of the forest itself, not scattered through it as in many eastern states. Only by state distribution can the cost be fairly equalized.

It is unlikely that our voters would consent, as they do in many states, to relieving the timber owner entirely of the burden of protecting his property. Nor is it necessary that they should. A strictly official system, in which only office holders spend only public funds, seldom if ever has the maximum efficiency until removed from politics, and this is hard to accomplish until its object is so thoroughly approved and understood by the public that no trifling is permitted. Self-interest must be appealed to in order to insure sincerity and, until the public fully realizes its own self-interest that of the timber owner must be utilized.

The timber owner and lumberman himself, by no means always wholly above education, must also abide by the operation of the law. He will support it better if he has a part in it than if he regards it solely as official restriction of his liberties.

For these reasons, the most practical system for western applications is one which—

(a) Places a fair share of the financial burden on the timber owner;

(b) Leaves execution with him insofar as his self-interest and technical competence tends to secure economy and efficiency;

(c) Assists him to make less willing owners do their part;

(d) Makes the state bear enough of the financial burden to discharge its obligation, enlist public support, and insure adequate protection;

(e) Gives enough supervision to insure honest execution and enough backing to enforce the law.

(f) Provides for education and sentiment-molding that cannot be charged with selfish motives.

There are two ways to carry out this policy. One is to enact a detailed law which attempts to govern the co-operation between state and private effort so specifically that neither can secure undue advantage. This assumes that both will try to. The other way is to take every precaution to get a competent non-political state forester and leave him as free as possible to deal with the matter. The latter is by all means preferable. By its very nature, and also by reason of its infancy, forest work is insusceptible of accurate forecast of detail. It may vary from year to year, from place to place. While the state's attitude may be fixed by legislation, that of the agencies it must co-operate with must be developed; and not by legislatures, but by the officials with whom they deal. A cumbersome or inflexible law prevents progress of any kind. A flexible law permits experiment and progress, which may be excellent. While it also permits abuse, this may always be stopped before much harm is done, because only one appropriation is involved.

State funds for forest work may be raised by direct appropriation or by a special tax. The latter seldom can, or should, be imposed until a thoroughly satisfactory administrative system is established. We should first get a competent forester to work out a permanent, financial policy, and present it to a later legislature for adoption. Until this is done, liberal direct appropriation is probably all that is safe.

The amount of this appropriation should have an actual basis, governed by the acreage and value of the state's forest resources and the risk to which they are subject. The state's participation is merely paying insurance to protect its prosperity. Every thousand feet of timber saved for manufacture and sale means the distribution of from \$10 upwards among its population. Every thousand feet destroyed means an equal loss. The interest alone on the annual loss by Oregon would pay many times the entire cost preventing it. Not to insure against this loss is folly.

There should, however, be some way of inducing forest owners as a class to live up to the policy adopted by the state. While it should be possible to meet emergencies anywhere that public welfare so demands, as a general policy state funds should go to help districts that help themselves, thus acting as a lever to encourage private and county efforts. This also fits the plan of placing the actual fire work in the timberman's hands to ensure efficiency. Again, it is obvious that where the most private money is spent is where large fires must be fought, and as large

fires mean property destruction also, the private cost is now borne by those whose losses make them least able to bear it.

Here we arrive at a distinction between patrol and fire fighting, and it is in this that most eastern systems are weak. They tend to provide for fire fighting or for prevention, and consequently cost more than they need to, with less actual protection. The ideal is to assist patrol, as well as fighting, in equal proportion of the cost, and this can scarcely be done without close co-operation between state and owner without a districting system determined chiefly by owners. Prevention, not fire fighting, is the end to be sought. It depends, in cost and efficiency, upon local hazard and ownership.

Any state falls into a greater or less number of districts demanding different measure and method of patrol best determined by those interested therein. The owner of the majority of the forest property in each should have chief voice in fixing the cost and method essential, all owners within this district should bear equal proportionate burden, and the state's proportion should bear the same relation to the acreage cost that it does in any other district. Like division should be possible for cost of fire fighting labor additional to patrol.

The most practicable solution of these many problems, at least at present, seems to be to modify the present Idaho district system so as to escape its regulation of state expenditure solely by state ownership, which is not adequate in Oregon. Wherever the owners in a suitable district will make concerted effort, the state should agree to bear a certain proportion of the cost provided there is a responsible local organization to carry out the protective policy decided upon. In localities where the owners refuse or neglect to maintain such organization, independently employed wardens should be appointed upon request, but without compensation by the state, as at present. In such localities, also, the state forester should be empowered to take any additional steps demanded by the public welfare in emergency, and perhaps to recover a fair part

of the cost from the owners of the land concerned.

To sum up, although the state's interest and financial responsibility is great, it can accomplish most not by building up an immense fire organization of its own, inviting political interference and at best requiring complicated and expensive supervision, but by encouraging and aiding local action by those whose own interest insures the maximum efficiency with the least state machinery. Where it cannot obtain this relief, and only there, it should take charge of the situation itself. If this system is followed, the expenditure of the state fire funds will be to best advantage, and the state's own forest service will be left fairly free to devote itself to other branches of forestry work, such as reforestation, public education, and making the many investigations badly needed before a permanent policy can be developed. Otherwise the state forester's entire time is occupied by fire work, which can do no better than others, and he has no opportunity to do the things which he alone can do.

Pennsylvania spends \$180,000 a year for forestry and fire protection, New York \$118,000, Maine \$64,000, and the other eastern and middle western forest states follow in line. Michigan expects to treble its present annual appropriation of \$19,000 this year. Minnesota appropriates \$21,000 and the towns bear the rest. Washington expects greatly to increase its present annual allowance of \$23,000. Idaho shares on a pro rata basis, amounting to about \$15,000 last year and double that this year. It is unnecessary to prolong the review further than to say that down even to little New Jersey, with \$13,500 a year, other states have left Oregon at the foot of the list in preservation of forest wealth and industries. None of them, having begun the work, abandons it. Their people endorse further progress by each legislature. Shall Oregon, with most at stake, remain the only laggard, inexcusably indifferent to the life and property of its citizens, and hazard worse disasters than those of 1910.



NEWS AND NOTES

Consumption of Tanning Materials

Tan bark and tanning extracts were consumed in the United States during the calendar year 1909 to the value of \$21,904,927, as against \$21,361,719 in 1908 and \$21,205,547 in 1907. Of these totals the outlay for extracts formed 49.2 per cent during 1909, 49.4 per cent in 1908, and 45.5 per cent in 1907.

While the total expenditure for vegetable tanning materials has been divided between the group of barks, etc., on the one hand and that of extracts on the other during the past three years, the average cost per cord of barks has advanced steadily from \$9.52 in 1907 to \$9.58 in 1908 and \$10.31 in 1909. This increase in the average cost per cord has been accompanied or followed by a corresponding decrease in the quantity annually consumed during the same period, the total for 1908 being 7.2 per cent less than that for 1907, and that for 1909, 4.3 per cent less than that for 1908. The most marked decrease in annual consumption is shown for hemlock, which was the bark used in greatest quantity in all three years, the reported total of this species for 1909 being less than that for 1908 by 13.8 per cent, and less than that for 1907 by 14.4 per cent.

The showing for extracts is similar to that for barks, etc., with respect to cost, though entirely different when the annual consumption is considered. The average cost per pound of extracts of all kinds consumed during 1907 was \$0.0264, while in 1908 it was \$0.0269 and in 1909 \$0.0278. The total consumption in 1909 was greater than that in 1907 by 21,918,360 pounds, or 6 per cent, though slightly less than that reported for 1908, the total for which year was the largest of which there is record.

The most marked increase among the leading extracts was in chestnut extract, the consumption of which in 1909 exceeded that of 1908 by 24.5 per cent and that of 1907 by 35.6 per cent. This movement in the tanning industry toward the supplanting of barks as materials with extracts has been discernible in the showings for several years past and follows logically the growing scarcity and rapidly increasing cost of the barks. Furthermore the fact that the supply of barks is not only diminishing but at the same time becoming more remote from transportation facilities contributes to the decreasing use of tanning materials in this form.

The tanning industry, or that portion of it using vegetable tanning materials, is widely distributed. The consumption of extracts was reported from 33 states, and of barks from 25 in 1909, but the four states of Pennsylvania, Wisconsin, West Virginia, and Michigan, ranked in point of consumption in the order named, used nearly two-thirds of the total quantity of barks reported, and, with Massachusetts, about three-fifths of that of extract. Pennsylvania continues, however, to be far in the lead of all other states in the quantity of both barks and extracts annually consumed, this state alone reporting 28.8 per cent of the barks and 32.2 per cent of the extracts used during 1909.

The Southern Appalachian Rivers

A detailed report upon the surface water supply of the south Atlantic coast and the eastern part of the Gulf of Mexico is contained in Part II of a series of government reports entitled "Surface water supply of the United States, 1909." This paper is published by the United States Geological Survey as Water-Supply Paper 262 and may be obtained from the Director of the Survey on application. It will be of particular interest in connection with the protection of streams by national forests under the new law.

Determinations of rates of water flow are of importance in leading to the most complete utilization of the power of a stream. At any reasonable valuation per horse power, the undeveloped power of these streams is an important industrial asset. In Georgia and the Carolinas, more than 100,000 horsepower has been developed and is being used by the cotton mills alone, and public service corporations in these three states are to-day developing 300,000 to 400,000 additional horsepower to turn the hundreds of mills and light the many towns and cities in the region. In the operation of the power plants already constructed and in the financing and building of those yet to be developed the problem of water flow is an important factor.

Projects for providing water for domestic supply, for irrigation, and for generation of power for factories can not be designed intelligently without a knowledge of the flow and the behavior of the rivers from which the supply is to be derived.

Methods of taking records and of computing rates of flow are described in detail

in the paper. The instruments employed are illustrated, and the manner in which they are used is shown.

Among the river basins considered are those of the James, Yadkin, Santee, Savannah, Altamaha, Appalachicola, Choc-tawhatchee, Mobile, and Pearl, with their most important tributaries. A summary showing the great divergencies in seasonal rates of flow exhibited by these streams is appended to the text.

A Canadian View

A very interesting letter has recently appeared from Senator W. C. Edwards, president of the Canadian Forestry Association, in favor of the reciprocity agreement. Coming from one of the leading lumber operators, timberland owners, and paper mill men in Canada, this letter contains some statements that are well worth noting. Among other things, Mr. Edwards says:

"Amongst the questions that attract more or less attention in the discussion going on at present in Parliament is that of the capturing and despoiling by the Americans of our natural resources. Our principal natural resources, so far as I am aware, are the products of the farm, the forests, the mines and fisheries, and of these, where the most fear is apprehended, are our forest products, say lumber and perhaps more particularly pulp wood; there are, in the minds of very many of our people, some very mistaken ideas with regard to this subject.

"In the minds of many Canadians the Americans have practically exhausted their forest resources, and are in immediate need of securing their requirements from Canada. This is not true. The United States possess to-day vastly more lumber than Canada and cutting as they are, say 40 billion feet per annum, they are said to have sufficient to supply their wants for from twenty-five to thirty years. Just where she is to look for her supply after that time I have no idea. Most people think Canada will then be her source of supply, but this is an error. For while it is true that up to date no approximately accurate estimate has been made of our timber resources, yet quite enough is ascertained to make it well known that the total timber resources of Canada suitable for lumber for immediate cutting would not supply the United States for more than eight or ten years.

"As far as pulp wood is concerned the situation is different. Our resources in spruce, suitable for pulp making, are very much greater than theirs, and again the total quantity required annually for paper making is quite a small item compared with the quantity of lumber consumed.

"What the position of the United States is to be 20 to 30 years hence in her lumber requirements is a great and important question, and one which is in their hands to solve.

"But the important question engaging the minds of some Canadians at the moment is that should the duty on Canadian lumber entering the United States be abolished, and that should the further provision take place, viz., that for the free entry of Canadian pulp and paper into the United States, the provinces relax their regulations that pulp wood cut from the crown domain shall be manufactured in Canada, that what will follow will be greatly increased exhaustion of our forests consequent on improved prices for our lumber and the sale of our pulp wood to the United States, and I at once admit that this is a most reasonable deduction to arrive at on the part of those unfamiliar with the true situation.

"The agitation against the exportation of pulp wood first arose on the part of the pulp and paper makers of Canada, with the view of circumscribing the market for their own selfish ends; but misguided and uninformed patriotism has now carried them away."

Continuing, he refers to the removal of the duty on lumber, and says it will not stimulate lumber production, but will let the Canadians penetrate a little further into the United States.

Then he continues "It cannot be attributed to me that I have any selfish ends to serve in what I suggest, as I am a protective pulp and paper maker and have never exported pulp wood and never expect to, and that my firm conviction is that the free admission of our lumber into the United States will not have the effect of increasing Canadian products, and that the removal of the manufacturing provision of the provinces, as applied to pulp wood, will do Canada incalculable good and no harm whatever.

"My frank opinion is that by far the greater benefit to be realized by Canadian lumbermen will be from the general improved conditions Canada will most certainly enjoy if the suggested lowering of tariffs on both sides of the line takes place. This, I believe, will be far and beyond the most sanguine expectations of the promoters and supporters of the proposition. And now as to pulp wood, I affirm that forest conservation is a matter by itself, and stands on its own bottom. The crown, represented by the various provinces, enacts the regulations and through such regulations controls the cutting. The matter of forest conservation is not involved in dictating to the limit holder the form in which he shall sell his product.

"Many of the United States mills have abundant supplies of pulp wood for many years to come. This is true of many of the Eastern mills, and in the West there is an enormous supply. In Oregon and Washington the pulp mills are cutting the largest and finest spruce, capable of making the longest and largest of dimension timber, into pulp wood for their immediate and prospective wants, and for a few years back have been buying some pulp wood in Canada, cut almost entirely on private lands, and the cheap price of Scandinavian pulp enables them to import from there. But many of these mills suffer another and most serious disability, viz., a shortage of water for grinding the wood, and this shortage is becoming more intense as time advances. There is the further condition that many of the American mills, and particularly those who have but a limited supply of wood ahead of them, are but temporary, and one by one will go out of existence.

"With our very large resources in pulp wood and our numerous and never failing water powers, particularly in the province of Quebec, there is but one sequence to this question. The ultimate destiny of a large share of the pulp and paper making of North America will be in Canada. But this result will come automatically and by evolution. Mills will gradually disappear in the United States, and excepting in places where there is a future supply of wood no new mills will be built there, and as fast as market demands their construction they will be built in Canada; but the construction in Canada will not be hastened one day by the provincial restriction existing, but otherwise. It will be retarded just as long as the maintenance of the American duty remains a consequent provision, and Canada will be most seriously injured. Freedom of entry into the United States for pulp and paper would encourage the construction of mills in Canada, but the reverse will deter judicious Canadians from so investing.

"That it is wiser that the transference of that large part of pulp and paper making that is to come to us should come fairly gradually, I personally feel no doubt of, and if the American market is open to us I am certain that the paper making will come to us as well as that of pulp, for apart from the transportation condition so favorable and advantageous to paper over pulp, there is the water power question I have mentioned, which is very essential.

"And in the meantime, as this automatic transference goes on, a rich harvest can be obtained by those who have spruce which they wish to dispose of, as the Am-

ericans who need the pulp wood will pay during the lifetime of their mills, a high price for it, and earn even small dividends on their properties rather than no dividends."

A Gift to the Yale Forest School

The gift of \$100,000 for a building for the Yale Forest School is announced. The name of the donor is not made public. The building will be erected upon the Pierson-Sage square. Following so closely upon the gift of \$100,000 by Mrs. E. H. Harri-man, to endow the chair of forest management, in memory of her husband, this indicates the interest which those of large means are beginning to take in forestry, and the recognition of the profession, and the need of thorough training therefor.

Conservation in Hawaii

On Wednesday afternoon, November 16, 1910, there was held in Honolulu, Hawaii, a public meeting to consider the local application of the five cardinal points of conservation—the right use of lands, waters, forests and minerals, and the safeguarding of public health. It was under the joint auspices of the Territorial Board of Agriculture and Forestry and the Hawaiian Sugar Planters' Association. In the audience were a majority of the sugar plantation managers and other members of that association, but in addition there was also present a goodly company of persons representative of the best thought and influence in the territory in other lines. Short addresses were made by Governor Frear, Messrs. Marston Campbell, Ralph S. Hosmer, Dr. E. V. Wilcox, Hon. W. O. Smith, Dr. W. C. Hobdy, Prof. C. H. Hitchcock, and Mr. Alonzo Gartley on various phases of the conservation problem in its local aspects.

In the speaking, mention was made of important co-operative work by the territorial bureaus, the United States Forest Service, and the United States Geological Survey. Ralph S. Hosmer, superintendent of forestry of the territory, spoke on the part played by the forest in conservation. He summed up the importance of forestry to Hawaii in these sentences: "In Hawaii forestry is a business necessity. Wood and water are the first needs that must be satisfied in any community. Both are products of the forest. Wherever it can be got water is the most valuable product that the native Hawaiian forest can be made to yield. In Hawaii, without the native forest we should be without water. And in our planted forests, we have, too, an asset constantly increasing in value; for the production of wood is one of the pressing needs of local conservation."

To Get In Under the New Law

It has just been discovered that Kentucky alone of the Appalachian states has not passed a law permitting the United States to hold land within the state under the new national forest law. Unless this is promptly remedied, therefore, the Blue Grass State will have to be left out of consideration for the present. As the Kentucky delegation in the House of Representatives cast five votes against the Weeks bill and none for it, and one of her senators voted against it, this seems a little like poetic justice, but it is rather hard on Representative Stanley, who worked for the bill long and consistently in the Committee on Agriculture, and would have been present to vote for it but for illness.

In this connection it is interesting to note that a bill to authorize the national government to establish forest reserves in Pennsylvania has been introduced in the legislature of that state. It is said to be part of the general plan of the flood commission for putting a stop to the periodical flood loss in Pittsburgh. Federal, state, county and city government are expected to co-operate in the carrying out of measures which will eventually be the means of impounding flood waters at their sources and using them during dry seasons.

Hardy Catalpas for Iowa

That the hardy catalpa is one of the best fence post trees that can be grown in Iowa, is the conclusion reached by the Iowa Experiment Station. Eighteen-year-old trees that have been properly cared for will yield from 2,000 to 2,500 posts to the acre. The gross annual return per acre per year on the Iowa plantations studied varied from \$10.77 to \$20.34. Copies of Bulletin 120,

giving directions for growing catalpas, can be obtained free by writing to the Iowa Experiment Station at Ames.

Publications of the United States Geological Survey

A new list of publications of the United States Geological Survey, just issued, contains the titles of more than a thousand books and pamphlets. These reports cover a wide range of subjects. They include not only papers on geology and topography but reports on water resources and on technology. The Geological Survey was the nursery of the United States Reclamation Service and the Bureau of Mines, which now, in full growth, are carrying along successfully work begun by the Survey years ago. The Survey, however, still continues its work on water resources and includes discussions of technology in its annual volume "Mineral Resources of the United States."

A glance at this list will show the great diversity of the subjects considered and the manifold nature of the science of geology. The reports include discussions of geologic chemistry, mineralogy, petrography, and paleontology, as well as ore deposition and other matters of very practical importance. Much of the Survey's late work has been directed to the study of mineral deposits of economic value. The work done in land classification has not yet found detailed expression in the Survey's reports, but some papers prepared as a result of land-classification surveys have been printed annually in bulletins entitled "Contributions to economic geology."

The list may be obtained by applying to the Director of the Survey at Washington D. C.



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STARR KING



THE CRAWFORD NOTCH

A WINTER VIEW, LOOKING SOUTH. THE RAILWAY LINE
SHOWS ON THE RIGHT AND THE CARRIAGE ROAD
ALONG THE VALLEY FLOOR. SEE PAGE 293

American Forestry

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STATE FORESTS IN VERMONT

By WALTER K. WILDES

VERMONT'S need of and uses for state forests are emphatic. The initial step to meet this need and to acquire areas suitable and available for state forests and the consequent development of this phase of the state forestry policy, was taken up by the legislature of 1908. At this time an act was passed creating a Board of Agriculture and Forestry consisting of four members—two ex-officio, the Governor and the Director of the State Experiment Station, and two to be appointed by the Governor. This board has the authority "to accept gifts of land to the state, to be held, protected and administered as a state forest reserve" and "to purchase lands in the name of the state" for the same purpose.

Such areas in a state possessing the physiographic features of Vermont, together with the natural beauty and scenery to attract many thousands of tourists and summer residents, will naturally be divided into three distinct classes, namely, demonstration forests, protection forests and areas that serve primarily as parks. Each class is represented in the four tracts now owned by the state of Vermont.

From the standpoint of the development of a state forestry policy the demonstration forest is first in importance. All such areas need not necessarily be forested for they serve in two essential capacities, the one to illustrate proper forest management and natural reproduction primarily; the other to illustrate the methods and results of reforesting areas with desirable species by artificial methods. In the former, thinnings of the proper intensity and species are made, either for the immediate improvement of the stand or to provide for such reproduction as the site and existing desirable species will allow. Another important advantage of such areas, where lumbering is practical, is to convince local operators that scientific cutting is profitable; that it is not necessary to cut clean in order to realize a legitimate return. Often times a contractor is skeptical when he is asked to figure on a cut where only marked trees are to be removed or where lopping and piling coniferous tops, in order to eliminate as far as possible the danger from fire, is demanded, or where closer utilization is required. Both owners and contractors learn, after an actual operation, that the extra expense imposed by the above conditions is only a very small percentage higher than the cost based upon the usual methods and that this excess is amply justified by the results.

On the latter areas, such as have been clear cut or burned over and are either not reproducing at all or with undesirable species or old pasture land that is producing only a small annual return per acre, reforestation operations appeal strongly to the people of almost all communities. It creates a more direct response and interest in forestry than any other phase of the work.

The first purchase of land as authorized by the Act of 1908 was made in the autumn of 1909, when the L. R. Jones State Forest at Plainfield was acquired. At the same time the state came into the possession of the Downer State Forest at Sharon by gift. Early in the present year two more areas were added, one given by the Hon. M. J. Hapgood at Peru, the other by Col. Joseph Battell near Huntington.

The development of this policy will be continued in various parts of the state as money and the disposition of those interested in granting similar areas will allow.

THE DOWNER STATE FOREST

This area of 310 acres, the gift of Mr. Charles Downer, comprises the following types:

Woodland	90 acres
Tillable	50 acres
Pasture	150 acres
Apple Orchard.....	5 acres
Swamp	15 acres

For a considerable period this tract will serve as a demonstration and experimental area, where improvement and reproduction cuttings will be made; plantations of various species, spacing and combinations set out; and silvical studies of several species, more especially sugar maple, will be carried on from year to year. It is the wish of the donor that a part of the area be utilized as a game preserve. The area is rough but not rugged, varying in elevation from 1400 to 1800 feet. The variation in soil conditions from swamp to the dry, thin soil at the highest elevation, gives a wide range for planting experiments and choice of species.

The woodland consists for the most part in sugar maple, varying in age from seedlings to over maturity. Other species are basswood, yellow birch, beech, ash, white birch, poplar, ironwood and hemlock. The minimum stand per acre is two cords, the maximum 6,000 board feet and 45 cords.

The treatment of the various blocks will include reproduction and improvement thinnings; the selection system; and the final cuttings of the stand system. All are advised with the idea of favoring either maple alone or maple, basswood and ash collectively.

A forest nursery was established in the spring of 1910. It will serve as a distributing point for that part of the state and, at the same time, provide stock for state planting. Only half an acre is now in nursery but this will be increased each year. There were planted in the nursery in the spring of 1910: 13,500 two year old white pine seedlings; 20,000 two year old red pine seedlings; 15,000 one year old white pine seedlings. Twenty-five pounds of white pine seed was sown. In 1911 fifty pounds of white pine and twenty pounds of Norway spruce seed will be sown. In addition 50,000 two year old white pine and 3,000 Austrian pines will be transplanted from the state nursery at Burlington. In 1910 plantations set out on final sites totaled 34 acres, consisting of: 12,000 four year old white pines; 7,000 four year old red pines; 10,000 three year old Scotch pines; 5,000 four year old Norway spruce.

In 1911 and 1912 ninety-four acres will be added to the area already planted and the following species used, in addition to those already named: Black walnut, black locust, white ash, red oak, European larch, basswood, Adirondack spruce and hickory. This gives a total area of 128 acres in plantations. Their purpose is to provide information relative to the effect on growth of different spacing, of pure and mixed stands, and the adaptability of the species to soil and altitude. In the final allotment of areas there will be:

Woodland	90 acres
Plantation	128 acres
Pasture	30 acres
Tillable	50 acres
Apple Orchard.....	12 acres

The area of pasture land will thus be reduced from 150 to 30 acres and the orchard increased from 5 to 12 acres. A complete system of trails will be constructed. These will lead to the different plantations and through several blocks of woodland.

The danger from fire, which is inconsiderable, has been provided for by limiting the extent of area of pure coniferous plantations and maintaining a fire line 100 feet wide at the most dangerous point.

THE L. R. JONES STATE FOREST

The L. R. Jones State Forest is an area of a different type and will be used more to illustrate proper lumbering methods and provisions for natural reproduction, together with plantations.

This area consists of 500 acres, 400 being purchased in the autumn of 1909 and 100 in the autumn of 1910. Of this total area there are 135 acres to be planted and 365 acres of woodland, thus utilizing the total area as forest land. Much of this area has been lumbered but there is still a considerable amount to come out. In the autumn of 1910 60,000 board feet of spruce and hardwoods were marked. The cutting will be completed by January, 1911. This material is cut, skidded and hauled, five miles, at \$7.00, and is being sold at \$10.00 per thousand, leaving a profit of \$3.00 per thousand, which is fairly satisfactory considering the small size of the material and the difficulty of cutting in dense spruce thickets.

There are two types of woodland. Hardwoods consisting of white and yellow birch and maple and beech from which the spruce and fir have been cut, comprise about 215 acres. The spruce and fir type, comprising about 135 acres, is an area formerly in pasture land or clean cut about twenty years ago, and since reclaimed by this growth. There is also a small area of older pure spruce that will be marked and harvested as soon as possible. The area is rugged, having a variation of elevation of 900 feet with considerable granite outcrop.

In the spring of 1910 there were planted 25,000 four year old white pines and 10,000 three year old Norway spruce. This work will be continued for the next three years, by which time the total open area will be planted with white pine, Norway spruce and arborvitae.

Lumbering operations will go on each fall, taking out the material marked during the summer. The maximum coniferous stand per acre is 18,000 board feet and 30 cords. The maximum hardwood stand per acre is 5,000 board feet and 15 cords. This area will consequently be upon a revenue producing basis considerably before the Downer State Forest.

There is already a very good road system, to which an extension has been staked out, running across the plantation made in 1910.

Because of the recent acquirement of the two areas last mentioned no plan for management has been formulated. They differ, however, in the possibilities for their development and use for forestry purposes, as they were given with certain restrictions, which will detract from their value as such.

The gift of Mr. Hapgood comprises 106 acres and includes the summit of Bromley Mountain in Peru; that of Mr. Battell contains about 800 acres, including Camel's Hump, one of the highest points in the state. These tracts will serve primarily for protective and park purposes.

TAXATION OF FOREST LANDS

A Review of Recent Studies in New Hampshire and Wisconsin

BY EDWIN A. START

THE vital importance to forestry of the question of taxation of forest lands is generally recognized and the subject is frequently attacked by foresters, lumbermen, economists and legislators; but so far without any tangible results. The crude remedy of exemption has been tried by some states but never with success. Attempts to remedy the recognized evils have been occasionally made but these have generally run upon the rock of unconstitutionality. For instance, in Massachusetts it was found that any application of sound principles to forest taxation would conflict with the provision of the state constitution, a provision which appears in many other state constitutions, which requires equal and proportionate taxation of all classes of property. The Massachusetts Forestry Association, therefore, united with the Boston Chamber of Commerce in an effort to secure a constitutional amendment providing for classification of property for purposes of taxation. So far this movement has been headed off by the innate conservatism of the state.

We are not in a position in this country to apply the elaborate methods of forest taxation that are in operation in Europe, because our forest conditions are so different and we have not a sufficient body of trained men of technical knowledge to administer laws based upon such knowledge; but it is admitted that we must do something and we are thus thrown at once upon the necessity of a thorough study of our own conditions and the evolution of a system applicable to them. Two comprehensive studies have been made by Forest Service experts cooperating with state officers, and the results have been published. The first of these was made by J. H. Foster in New Hampshire in 1908. The second, the results of which have just been published, was made by Alfred J. Chittenden and Harry Irion in Wisconsin in 1910.

These states are geographically wide apart and different conditions are found in them, but it is curious to note the parallels between them and how closely the two taxation studies run with each other. In both states lumbering and pulp and paper making are industries of great importance. Both states divide naturally into two sections—a southern agricultural district, where forests chiefly exist in the form of farm wood-lots, and an extensive northern district where natural forest lands predominate. In both the northern type of forest is the prevailing one, though the hard-wood belt reaches up across south-



Photo by A. F. Hawes
VIEW SHOWING BUILDINGS IN THE DOWNER
STATE FOREST



Photo by A. F. Hawes
RED PINE PLANTATION MADE IN SPRING OF
1910. DOWNER STATE FOREST



Photo by A. F. Hawes
STATE FORESTS IN VERMONT
FOREST NURSERY. TRANSPLANTS OF RED AND
WHITE PINE. DOWNER STATE FOREST



Photo by A. F. Hawes

NATURAL REPRODUCTION OF SUGAR MAPLE,
THREE TO TEN FEET HIGH. DOWNER STATE
FOREST



Photo by A. F. Hawes

STATE FORESTS IN VERMONT

YOUNG MAPLE ORCHARD THINNED TO HELP
GROWTH OF BEST TREES. DOWNER STATE
FOREST



Photo by A. F. Hawes

GENERAL VIEW IN L. R. JONES STATE FOREST.
NOTE EVERGREENS RECLAIMING OLD PASTURE

ern and central Wisconsin. In general it may be said that the conclusions of the investigators in regard to existing conditions and desirable changes were very similar.

Both of them start off with the statement that owing to the difference between the agricultural and wild land portions of the states, the study of taxation and of the fire problem falls naturally into two divisions. Mr. Foster, in his earlier report, reached the general conclusions that "(a) the actual tax burdens imposed on forest lands of the same value are not equal or proportionate as the state constitution requires, either as between the different towns, or different tax payers in the same town. (b) In general the law has not been strictly enforced in the past as is shown by the fact that little land reverts to the town because of unpaid taxes. Sometimes an owner believes that the tax is more than the land can stand but in such cases a purchaser has always been found. This is due to the fact that growing timber has usually been assessed much below its actual market value and the burden of taxation thus has been lighter so that the lands can carry it. (c) In the search for revenue to meet the natural necessities of the town a strong tendency has recently developed to enforce the law more rigidly and valuations have in many cases been increased with startling rapidity. This rapid increase in valuation cannot be long continued and applied to these cut-over lands after the owner has been forced to cut without causing abandonment. Such has been the result of the policy in California and in Michigan where the state has acquired and owned a million and a quarter acres of abandoned tax lands, and to a less extent, in other Lake states. (d) As between the farmer and the mill-man, to whom he sells his wood-lot, taxes have in the past been very low to the farmer while the timber was in his hands and some attempt has been made to appraise it at more nearly its actual value, or rather to approximate the selling price, which is often unduly low, when it is bought for lumbering. Usually, however, it is cut at once and the town collects taxes at the new appraisal but one year if at all. The consequence is that the timber escapes its fair share of the public burden. (e) The present law, granting a percentage exemption to owners who have planted their land to timber, is not taken advantage of to any extent and is wholly inadequate. Most of the land upon which there is growing timber is seeded naturally and therefore does not come within the law. The exemption ceases wholly in thirty years, at the time when it is to the advantage of the town as well as of the owner to let it mature further. Moreover, tax exemptions are of questionable advantage and excite hostility to those taking advantage of them."

This statement of general conclusions resulting from an examination of New Hampshire conditions will be recognized by residents of other states who have had occasion to look into this matter of the taxation of forest lands. So closely do the conclusions of the Wisconsin report follow those that have just been quoted from New Hampshire that it is unnecessary to repeat the latter. The differences are only in minor points.

In discussing the question of how forest property in New Hampshire should be taxed, Mr. Foster calls attention to the fact that if the land tax is to be equal as between different land owners, it must take one of three forms: (1) a uniform percentage of the actual sale value of the property as it stands; (2) a uniform percentage of the actual income from the property; (3) a uniform percentage of estimated power of the soil for potential income. He then notes that in this country the first form is the one in use, although the assessment of agricultural lands in actual sale value is generally placed unconsciously upon the fertility of the soil for its potential yield. The assessment of forest lands is based upon their supposed actual sale value, but the

land itself is not considered. It is the value of the growth upon the land which indicates its sale value. Agricultural crops, being harvested annually, escape taxation entirely. Forest lands, therefore, are not taxed upon the same basis as agricultural lands, although there is no provision in the law for such distinction. Herein, of course, is one of the essential elements of injustice in the taxation of forest lands, as it is applied generally in our agricultural communities. The second and third forms of taxation, as analyzed in the statement above, are applied in Europe to a large extent and forest taxation is much more equitable there and this tends to promote good forestry. "In this country," says Mr. Foster, "the system of assessing property at its actual sale value and taxing it at a uniform percentage of that value works well enough when applied to agricultural land; but when applied to growing forests it is both unjust and unwise. It is unjust because it ignores the fact that growing timber, before it is large enough for market, has only a prospective value and the income or return can only be obtained at long intervals. It is unwise, because the system often forces the owner to cut the timber before it is mature." Later on the author calls attention to the danger of the present law if it is enforced to the letter. Should it be applied to growing timber lands generally, there would be, he says, a tremendous slaughter of half-grown timber.

In this connection, there may be cited by way of illustration, a case which arose a few years ago in a northern state in which a non-resident owner of a thousand acres of timberland in a rural town had his valuation raised from \$7,500 to \$22,500, that is, the valuation was tripled in one year without warning and the owner had no redress against this arbitrary action of the local board of assessors. The laws of this state are those in common application in most of our eastern states and this thing can be done almost anywhere. It raised a serious question with this owner as to whether he should cut off the timber and dispose of the land or not. He was a public spirited gentleman, interested deeply in forestry, and had held the land rather for the public benefit than for his own.

The New Hampshire report states the requirement of the situation there as follows: "What is needed in this state is a method of taxing forest lands which can be administered by the towns in conformity with the established function and procedure of our local government; which insures an annual revenue while the timber is immature commensurate with that formerly derived with the low appraisal of immature timber held by farmers and others; which imposes a fair burden upon the timber crop when it is cut and collects it from the person who cuts and sells the timber. This burden will be a tax on the yield or income and not on the land or capital. It should, therefore, be relatively high. To prevent speculative holdings without taxing of land chiefly valuable for residence, manufacturing or farming purposes, the law should be restricted to lands found by the selectmen and assessors to be chiefly valuable for the production of wood and timber. Timber cut from land so classified should be taxed when it is severed from the land and should not be removed until a tax of 15 per cent of the value of such timber has been assessed and collected by the selectmen, or proper security shall have been given to them. Finally, since timber now half-grown or mature has presumably been taxed in accordance with the present law, and since it is desirable to introduce the new system gradually, the new method of taxation should be applied only to forest tracts upon which forest growth has recently started, and then only at the option of the land owner." Following this, the report suggests a form of act covering its recommendations and this was made the basis of a bill in the New Hampshire legislature which, however, failed to pass.

This draft provided for the separate classification for taxation of land chiefly valuable for the production of wood or timber, and occupied by a natural

or planted growth of trees, approximately three-fourths of which do not exceed the age of ten years. The land so classified and recorded according to provisions specified in the act, is to be assessed annually at the average value per acre, exclusive of the value of any wood or timber thereon. The timber and wood removed from any such tract is to be assessed for the year following the first of April after such cutting at the uniform and equal rate of 15 per cent of the appraised value on the stump. There is an exemption of \$25 in value in any one year of wood cut for home use on a farm. The act provides in great detail for the carrying out of these main provisions.

The Wisconsin report, which is somewhat more extended than its predecessor, although following the same general plan, after a description of forest conditions in the several counties of the state and the citation of numerous actual examples of forest taxation, considers the methods of assessing timber lands. In this respect Wisconsin seems to labor under about the same conditions as other states. There are the same elastic interpretations of the law, the same inequalities of administration, and the same incompetence frequently on the part of local officials. The views of lumbermen are given and make an interesting feature of the report. The relation of fire protection to the taxation question is discussed, for it is well understood that these two must go together. Probable returns from forest investment are considered and tables are given to show the possible returns by decades in periods from thirty to eighty years. The authors note that the fact that taxation has not materially affected lumbering in Wisconsin in the past is no indication that it will not in the future, and they say plainly that "the possibility of the practice of forestry by private owners depends on two things—an equitable system of forest taxation and protection from forest fire." In making recommendations for legislation in Wisconsin the proved inefficacy of bounties and exemption is noted. For the encouragement of the cultivation and care of wood-lots, it is suggested that owners may have tracts not exceeding forty acres separately classified for taxation by application to the state board of forestry under whose direction all cutting and removal of trees shall take place. Such land is not to be assessed at exceeding ten dollars per acre and taxed annually on that basis. Before any timber is removed from the land the owner shall pay to the proper county officer an amount equal to ten per cent of the stumpage value of the timber, provided that any material which is actually used for domestic purposes by the owner or his tenant shall not be subject to such a tax. This plan, it is explained, is to encourage and make it profitable for the small owner, especially the farmer in the agricultural district to utilize a part of his land for the production of wood and timber.

For private forests without limitation as to area it is also suggested that they may be separately classed for taxation, such classification being subject to the determination of the state board of forestry as to whether or not the land is suitable for timber growing. If it is decided to be suitable for that purpose, in making the assessment the land shall not be valued at more than one dollar per acre and the assessors shall in no case take into account the value of the growing timber. Whenever any timber or wood is cut from such land the owner shall be required to pay an amount equal to ten per cent of the gross value on the stump of the wood and timber so cut. There are various provisions for making proper returns and securing the state and penalties for making false returns. The report says that "conditions in Wisconsin indicate that a tax on the yield together with a nominal, annual tax on the land, is superior to any of the various tax laws that have from time to time been proposed." The authors, however, express their opinion that it would be better if no annual tax were levied on the land and the whole tax were made upon the yield, but

the objection to this is the usual one that it might disturb the fiscal affairs of the community.

It will be seen that the recommended legislation for these two states while showing slight differences in application is on the same general principle, and this, it may be added, is the only method that has yet been proposed that seems to be adapted to present American conditions.

In conclusion, the report does not hold out any great hope that private forestry on a large scale would be extensively promoted even with such an adjustment of the tax laws. The authors believe that for a future permanent timber supply the main dependence must be upon state ownership and it is recommended that the state secure by purchase in the open market such lands as it is desirable for it to own for this purpose.

These two reports will be found an interesting study by all those who are interested in this important public question of the taxation of forest lands. It will be seen even from this somewhat cursory review that the conditions and conclusions are not materially different from those which have been found by other students of the subject in various eastern states. The final result of all such studies seems to be the necessity of adequate fire protection by the state in order that property in forest lands may have in a measure the same security that other property enjoys; equitable taxation, so that owners of such property will not feel obliged to cut over their lands and dispose of a crop which is unprofitable to them, although it may be needed by the state; and finally that we must come ultimately to the same end as the most progressive European states and include as state property lands which are valuable only for the purpose of growing forests and which, therefore, have a greater value to the community than to any individual. When the main object was to clear the land of the forests, such a condition as this did not exist, it was unnecessary for the state to intervene, although it might well have done so at an earlier date; but now that the necessity of husbanding our forests for a future timber supply and protecting our water sheds for the permanence of a water supply and the equable flow of our streams is generally recognized, our attitude toward forest lands and the question of state ownership of such lands, must be radically changed. Such lands can be handled to the best advantage by a well organized department directed by experts and doing its work on a large scale. In most cases, especially in our populous states, the state is the only agent through which this work can satisfactorily and economically be done.



Reforestation in the National Forests

Tree planting is not a leading activity in the national forests, but it has its place, which is one of increasing importance. In March we published an article on the harvesting of the annual seed crop in the national forests. The accompanying series of pictures illustrating various processes in the work of artificial reforestation, from the national forests in several states, will give an idea of the nature of this interesting work.



DRYING CONES IN SUNSHINE. WASATCH NATIONAL FOREST, UTAH



IN FOREGROUND TRANSPLANT DOUGLAS FIR SEEDLINGS, ONE YEAR OLD, TWO INCHES HIGH; IN BACKGROUND, TRANSPLANT WESTERN YELLOW PINE SEEDLINGS ONE YEAR OLD, TWO AND ONE HALF INCHES HIGH. NURSERY, WASATCH NATIONAL FOREST, UTAH



A PLOT IN THE FREMONT EXPERIMENT STATION, MANITOU, COLORADO, SOWN JULY 23, 1910, BROADCAST AFTER HARROWING, WITH YELLOW PINE SEED, 18.59 POUNDS PER ACRE THIS PLOT SHOWED 819 SEEDLINGS ALIVE AND 21 DEAD. EACH SEEDLING IS MARKED WITH A STICK



SEED BEDS AT PLANTING STATION NEAR PALMER LAKE, PIKE'S
PEAK NATIONAL FOREST. DRILLS ARE SIX INCHES APART
AND STAND VARIES FROM 70 TO 150 PER SQUARE FOOT OF
DOUGLAS FIR, AND 40 TO 60 OF YELLOW PINE



SPRAYING APPARATUS AT WORK IN TWO-YEAR-OLD SCOTCH
PINE SEEDLINGS, NEBRASKA NATIONAL FOREST NURSERY,
THOMAS COUNTY, NEBRASKA



SECTION OF TRANSPLANT BEDS, PARTIALLY
SHADED BY OLIVE TREES. SAN MARCOS
NURSERY IN SANTA BARBARA NATIONAL
FOREST, CALIFORNIA



DIGGING AND BUNCHING YELLOW PINE FOR
SHIPMENT AT THE NURSERY IN THE
WASATCH NATIONAL FOREST, UTAH



HEELING IN SEEDLINGS. LYTLE CREEK PLANT-
ING STATION, NORTH FORK OF THE SAN
GABRIEL, CALIFORNIA



BED OF RED CEDAR TRANSPLANTS PLANTED AT
GARDEN CITY PLANTING STATION, KANSAS
NATIONAL FOREST, KANSAS



METHOD OF PACKING OUT SEEDLINGS TO
RANGERS FOR PLANTING IN NATIONAL FOR-
ESTS. ANGELES NATIONAL FOREST, CALI-
FORNIA



CLIMBING A TREE TO GATHER BIG CONE SPRUCE
SEED, CALIFORNIA



SEEDING MEN SOWING CEDAR SEED BY THE
SEED SPOT METHOD. SKAMANIA COUNTY,
WASHINGTON



SEED SPOT SOWING OF SCOTCH PINE, NORWAY
SPRUCE, AND EUROPEAN LARCH, ON A BURN OF
1909, IN THE WENATCHEE NATIONAL FOREST,
WASHINGTON



PLANTING GANG ON PLANTING SITE IN CHAPARRAL, SANTA BARBARA NATIONAL FOREST, CALIFORNIA



WHERE SEEDS HAVE BEEN SOWN BROADCAST
CUSTER PEAK EXPERIMENTAL STATION,
LAWRENCE, SOUTH DAKOTA

FOREST FIRES IN NORTH AMERICA

A GERMAN VIEW

BY PROFESSOR DR. E. DECKERT, FRANKFORT.

TRANSLATED BY GEORGE WETMORE COLLES.

(This article is condensed from the essays of the author in Nos. 241 and 243 of *Frankfurter Zeitung*. It is valuable as showing the view of a trained German observer who has traveled extensively through our American forests. Naturally there are minor errors of fact, which it does not seem necessary to correct as it is the general viewpoint that is of value.—EDITOR.)

DEVASTATING conflagrations of an extent elsewhere unheard of have always been the order of the day in the United States. From time to time they have swept Boston, Chicago, Baltimore and San Francisco. Forest fires also have always occurred in the domain of the Union far more frequently and have been more devastating than in any of the countries of Europe, and in numerous cases have raged over many thousand acres, continuing for weeks and even months, until they have been brought to an end in one way or another. Human measures for confining and extinguishing them, such as ditches, earth-walls and back-fires have met with success only in rare cases; in the majority of fires it was rather the greater natural boundaries, such as broad streams and lakes, bare rock and sand-wastes, or heavy precipitation of snow and rain, which put an end to the fire. Burning limbs have been quite frequently borne over considerable obstacles, even over streams three hundred feet in width, so that the fire continued on the other side.

The damage which the natural resources of the United States have suffered from forest fires has long been known to be colossal, but to state it in exact figures, in a country in which lumbering, until the present, has almost always been carried on in the most extensive and wasteful manner, is extremely difficult, if not impossible. Moreover, the causes of the fires, the manner and reasons for their propagation and the possibility of effectually fighting them, have long been a matter of doubt and dispute, so that the most contradictory and absurd views on these points have obtained currency. In American lumbering circles the conviction began to grow in the eighties that the first cause of the evil was bad American customs and want of conscientiousness, and that the "ghost of the American forests" could be laid if a change in this respect were brought about.

The first effort to determine the number and extent of forest fires for the different sections of the country and hence the most necessary foundation for the proper diagnosis of the root of the evil was made by the well-known American economist, Francis A. Walker, who took advantage of the United States census figures of 1880. He found from the incomplete reports which he collected that in the year 1880 there had been 2,580 fires, and about

7,750,000 acres more or less had been burned over in the United States. In the number of fires, the principal states in their order of importance, were as follows:

Pennsylvania	.381
Michigan.	.267
North Carolina.	.221
Ohio.	.192
Massachusetts.	.159
Wisconsin	.108
Kentucky.	.106
New York	.102

In the total area of forest burned over, the list is as follows in the order of importance:

Tennessee	.985,000 acres
Missouri.	.785,000 acres
Georgia.	.705,000 acres
Pennsylvania	.685,000 acres
Alabama.	.570,000 acres
Kentucky	.557,500 acres
North Carolina.	.545,000 acres
Wisconsin	.405,000 acres
Michigan.	.237,000 acres
New York	.150,000 acres
Massachusetts	.14,000 acres

The figures give no conclusion with regard to the extent of the individual fires and the value of the property destroyed, but it can be deduced from the above that the average extent of the fires was:

Massachusetts	88 acres
Michigan.	890 acres
New York.	1,470 acres
Pennsylvania.	1,800 acres
Wisconsin.	3,750 acres
Alabama.	7,920 acres
Missouri.	8,090 acres
Georgia	13,050 acres
Tennessee.	13,490 acres

From the above, it will be seen that there is a wide difference in the extent of the fires in the different states, and that there is a certain connection between this figure and the condition of culture of the state, showing that in the highly cultivated northern states, people have already learned better how to police the forests and keep fires under control than in the southern states, with their meager population and large negro element. The high figure for Missouri is to be accounted for by the climate, which is a notably drier one and more favorable for the spreading of fires than that of Massachusetts or New York. In general, it goes without saying that great confidence cannot be placed in the statistics of a single year, even if the reports were complete.

With respect to the causes of fires, an indisputable conclusion is drawn from Walker's investigation that sparks from locomotives are to blame in a great number of cases. Out of the 2,580 fires of the year 1880, no less than 505, or 19½, per cent are laid to this cause. The individual states give the following percentage:

New Jersey	.52 per cent
New Hampshire.	.44 per cent
New York.	.42 per cent
Delaware.	.42 per cent
Pennsylvania.	.35 per cent
Massachusetts.	.33 per cent

so that in the most highly cultivated districts, and those having the thickest network of railways, the figures rise to a fearful height, which suffices to explain the above given high totals of the individual fires in these districts. In Tennessee, only 8 per cent of the total was due to locomotive sparks; in Alabama 6 per cent, in Georgia 4 per cent, and in Mississippi but 3 per cent, because the railway systems of these states are much less developed, so that in general, fires in those states must be ascribed to other causes. For the northern states the results of this investigation had a practical fruit, inasmuch as it led to the passing of laws to regulate the railways and to compel them to take steps to prevent damage or at least to confine it to the narrowest limits. These laws have been enforced with unquestionable success.

That the carelessness and conscienceless negligence of hunters, stockmen, lumbermen, prospectors, and tourists, who light fires for one purpose or another in the forests or around their borders, was the cause of a very much larger number of forest fires in every state of the Union without exception, has been sufficiently proved by the statistics of the year 1880. But in so broad an area of what is still largely a primeval wilderness, the root of the evil is much more difficult to get at. What is needed above all is a thorough-going organization of the forces and available means for forest protection, as well as a slow and long-continued campaign of education. In this direction the statistics in question have evidently borne fruit, especially since a later census of forest fires taken in 1891 by the Forestry Division of the Department of Agriculture, which gave similar conclusions to the previous ones of Walker. It is true these reports were still extremely incomplete, but then they related to a much larger area burned over in the year in which they were taken, namely, 12,000,000 acres. Besides, everyone who was familiar with the facts recognized that the figures of the years 1880 and 1891 were far below the maximum of damage to the national domain which the forest fires of a single year could reach, and that this maximum for the eighties and nineties amounted to about ten times the value of the annual useful consumption of wood.

What a contrast was this situation to that in European countries, where good forestry laws were in force! In the Prussian states, for the decade ending with 1891, there were in all 156 greater fires, four of which were caused by locomotives, three by lightning, 53 were of incendiary origin and 96 caused by negligence, and the total area devastated during the year 1884 and 1887 was 3100 acres. Bavaria, in the year 1892, with its unusually hot and dry summer, has a record of but 49 fires covering only 5000 acres. These figures in comparison to those of North America are absolutely negligible, and form a brilliant vindication of the forestry system of middle Europe, while at the same time they force us to the conclusion that in North America there are other factors to be considered besides those above mentioned, although these latter doubtless represent the principal causes of forest fires.

The movement for a better system of forest management and forest protection became a very strong one in all the states of the Union during the nineties and everywhere was productive of good results. In New York, Pennsylvania, Maine, Massachusetts, New Jersey, Minnesota, Michigan, Wisconsin, California, Oregon, and other states laws were passed for the protection of

forests and foresters appointed for their execution. In Biltmore, Ithaca, Cambridge and Ann Arbor schools of forestry were founded, state forest reserves were established (in Pennsylvania 600,000 acres), and in particular, special fire wardens, with a greater or smaller number of assistants, called rangers, were put in charge. But the most significant result of the movement was the resolution of the federal Congress, 1891, constituting a large part of the forested areas of the public lands still existing United States Forest Reserves, and subjecting them as such to the management of the central government. At first only 18,000,000 acres were set aside, but since then more than 150,000,000 acres have passed into the reserves, but of this amount, only 120,000,000 acres are actually forested, so that at present a full quarter of the total forest area of the United States belongs to either state or federal reservations. In these public forests, which embrace the largest part of the western mountainous districts, in more than 50 large tracts—almost the entire Sierra Nevada of California, the Cascade Mountains, the Mogollon Mountains of Arizona, great stretches of the principal mountain chains of Colorado, Big Horn Mountains, etc.—the natural conditions of the North American forest growth and hence also the principal causes and conditions of forest destruction by fire and other factors have been thoroughly studied out by experts in their special lines, and thereby with surprising rapidity ways and means have been found to combat the inception and spread of fires very effectively in most years.

In 1909 President Roosevelt, who had taken a great personal interest in the movement for forest conservation, was able to announce with well-justified satisfaction that during the preceding year only about one-tenth per cent of the entire area of the forest reserves had been visited by fire; while in 1906 the area visited was about one-sixth per cent, and in 1907 about one-seventh per cent. This was indeed a brilliant success for the new forestry system, and it must be conceded that the officials concerned, both of the Land Office and Department of Agriculture, did their full duty. In 1899 there were nine superintendents, 39 supervisors and 300 rangers, and with the growth of the forest reserve area several thousand were subsequently added. In the years 1896, 1897, 1898 and 1900 some still very destructive fires had raged in these areas and the proportion devastated annually had amounted to 8 to 15 per cent, but careful investigations in the reservations established the fact that in earlier years far greater portions of them had been frequently burned over. In the Black Hills reservation of South Dakota, the Big Horn reservation of Wyoming and the Priest River reservation of Idaho, the forest floor showed everywhere more or less fresh traces of fire. In the Cascade mountains, out of 3,000,000 acres only 25,000 (eight-tenths per cent) showed no traces of previous fires; in the northern Sierra Nevada out of 2,950,000 acres, only 77,000; in the Pike's Peak and Bitter Root reservations, only about twenty per cent. Even in the forests of the east, which for the most part had remained in the control of private persons or local governmental bodies, the new era brought with it a decided change for the better, notwithstanding the fact that in Minnesota, Wisconsin and Michigan, during 1889 and 1894, a succession of immense fires took place. The years 1908 and 1909 brought no essential alteration in the favorable condition of things in the west, while on the other hand in New England and in Minnesota, Wisconsin, and Michigan, there were during 1908 a number of the most frightful and devastating conflagrations; and now this year 1910 has brought to the west in its turn, and especially to the states of Montana, Idaho, Washington, Oregon and California, a baptism of fire, which is absolutely without parallel in the history of these states. In such a case as this, the police system of United States fire wardens and rangers, and in

fact the brand new system of the United States forest reserves, completely broke down just as the incomplete organization of the eastern states had done in 1908, and a large number of the brave fire-fighters met their death in their zealous efforts to extinguish the flames.

How such a catastrophe could take place after the great progress of the previous decade is a question easily answered both on general geographic considerations and also with the assistance of the information provided by the numerous handsome volumes of the United States Geological Survey relating to the different reservations. In the first place, it is to be observed that in the United States, and especially in the west, it is unfortunately impossible to combat the original causes of forest fires in as effective a way as is done in Germany. The rough men who find their living in the eastern or western wildernesses, in mining, hunting, stock-raising or other interests, can not be prevented from building camp-fires, which are positively necessary for protection against the cold of night as well as for cooking, nor on the other hand can they be forbidden the enjoyment of their only pleasure, tobacco; and to find a spot absolutely free from danger for camp-fires is, in such circumstances, simply an impossibility. On this point, the author of these remarks, who knows the wild west and its inhabitants quite well from his own experience, must confess that even he, when on his journeys of investigation, has frequently built his camp-fire under press of circumstances in places which he knew in advance to be dangerous, and in several cases narrowly escaped the responsibility of thousands of others for negligent fire-setting. In one case it was only with the greatest difficulty that he and his party succeeded in extinguishing a blaze which unexpectedly leaped its bounds and which would have utterly destroyed an extensive forest area of Arizona. Camp-fires in the woods which are carelessly watched or are abandoned without being extinguished must necessarily escape in large part the notice of the forest guards on account of the enormous extent of the areas under their jurisdiction and the fact that wide stretches are unprovided with roads or trails. Even those fires which are negligently caused by locomotive sparks can not be prevented in North America in the same degree as in Europe, simply because much greater lengths of track are concerned and because the lay of the land in many cases does not permit the laying out of fire-lanes. With the experience of the last decade, however, it can no longer be doubted that with a well-organized patrol, fires of this sort can generally be extinguished before they reach a too great extension. In a similar manner it may be possible to effectively combat a large proportion of intentional fires. It was formerly common for both Indians and white hunters to thoughtlessly set underbrush ablaze merely to scare up game, and many of such fires were propagated indefinitely. Such vandalism is at the present time limited in most places, and in so far as it yet exists, there is a good prospect that its days are numbered. But far more numerous have been those fires which have been started for clearing purposes or for burning brush and rubbish. Particularly in the northwest, in Oregon and Washington, where the growth of the giant trees in many places is so great that it seems impossible to dispose of them with axe and saw alone, it is quite general to resort to fire and dynamite to accomplish the clearing. In the east, too, it has been the rule to get new land for cotton or grain plantations by burning off extensive wooded areas, and the farmers care little for the charred trunks which are left standing. Not a few of the fires so produced have continued far beyond the limits set for them, and this has been one of the most frequent causes of very great forest fires in the newly settled districts. Of course the new forest guards of the United States have given special attention to this cause, and by insisting

upon proper preventive measures in clearing lands they have succeeded in preventing serious damage in most cases.

More difficult to handle have proved cases of malicious incendiarism. It is a matter of experience that evil doers in North America can much more easily escape the eye of the law than in European countries, simply because of the greater area and more numerous hiding places, and the lynch-law system as commonly practised can hardly improve the matter, as in such cases an innocent party is taken and punished for the guilty even more frequently than in the case of other crimes. Fortunately the number of malicious fires in the United States has probably never been great. But besides these human fire-setters, there is a natural one which assumes importance in the least accessible districts, namely, lightning. In the North American west fires are started by lightning with uncommon frequency, and as many storms there yield hardly any rain, the flames which follow it are not as a rule extinguished as in the east. From his investigations in the San Francisco mountains of Arizona, J. B. Leiberg, the most distinguished expert of the United States Geological Survey, came to the conclusion that in this reservation by far the greatest number (about sixty per cent) of all fires are caused by lightning.

And this brings us to another principal factor which must be considered responsible for the rise and spread of forest fires in North America—the climate. It has long been known not only that the North American climate is much drier than the European, but that in the west the drought is long-continuing, even to the point of complete rainlessness, while in the east, in spite of the large annual rainfall, there are periods of drought of greater or less length. What effects are produced by such a climate on the forest and its inflammability can be readily understood. In Germany, double precautions are taken in dry years, and in spite of this the fire damage increases in such years; in North America, the highest possible degree of care is demanded every year, and in dry years the greatest conceivable care is insufficient to prevent the spread of individual fires over immense areas. Such a year in the east was 1908 with its gigantic conflagrations, in the west 1910; so that we are not to presuppose for such years an unusual number of malicious or negligent persons, for natural conditions are without doubt principally responsible in these special cases. The forest-floor of the western woods with its dry pine-needles, twigs, moss, grass and general undergrowth and its millions of dead trunks thrown down by storms forms in late summer and autumn a tinder which can be set off by any small spark; but in the present year, in which the summer drought set in in the middle northwest unusually early and was extremely severe, it was still drier than usual, and fires had passed human power to control before their existence was known.

Since the woods of the west consist principally of conifers, whose large content of rosin makes them much more inflammable than other trees, it is to be presumed that the destruction was very complete. Certain species, however, more particularly the yellow pine, offer a great resistance to forest fires, and where they stand unmixed and without any great undergrowth they frequently escape being killed. For this reason even in the driest parts of the west, such as Utah, Nevada, Arizona and New Mexico, where there are many pure stands of yellow pine, the destruction by fire is seldom so radical as in the less dry areas of Idaho, Montana, Washington and Oregon, in which the stands are usually mixed and in addition present a ground covering which is very combustible after it has been exposed to the summer drought; besides, the numerous standing dead trees, and areas of dead trees, which have been killed off by insects or other conditions, are highly favorable to the spread of fires in the forests of the northwest.

Naturally, before the nature of these latest fires can be determined in all their details we must wait for a more exact determination of the facts. The area covered by them must have reached well over 250,000 acres, and that the forest reservations in spite of their good patrol service have suffered extremely heavily is already established. But hardly anyone would advocate the restriction of the forest service on this account. Rather after this new disaster, will measures be taken in the future to place twice or three times the number of rangers on guard over the dangerous districts in years in which summer drought sets in early and is particularly severe.

In the eastern half of the union climatic conditions are quite different from those in the western half, both as regards the character of the trees and also that of the fires, and taking it all in all, it is much easier to maintain an effective fire guard there. Only once in many years is there a complete drying out of the forest-floor like that of Idaho or Colorado, and natural fire lanes are provided by broad rivers and numerous lakes and marshes, and moreover the land is rendered much more accessible by roads and trails than in the mountainous districts of the west. Nevertheless whenever a fire breaks out in the vast white and black pine woods of Maine, Michigan, Wisconsin and Minnesota, the danger of its spreading over a wide area is still very great, and especially in dry years the guards have a much more difficult task to extinguish fires than in Europe. Even in those districts the forest-floor is drier on the average in late summer than it is in Europe, and the woods are clogged with fallen and standing dead trunks.

Similar conditions exist in the turpentine woods of the great coast plain which extends from New Jersey to Texas. In these woods the great pitch content of the trees increases the danger, while the presence of broad stretches of marsh along all of the streams diminishes it.

In the mountain forests of the southern Appalachians, in which oak, hickory and other foliage trees predominate, fires are still frequent, yet on account of the greenness of the fuel they seldom do the same damage as in other parts of the country. Ayres and Ashe have established the fact that in the Appalachian area four and one-half million acres, about 80 per cent of the total, have been damaged by earlier or later brush-fires, but only 78,000 acres totally destroyed. In the mountain woods of the northern Appalachians, where conifers predominate, fires are generally of a more devastating character, and even in the Adirondack state reservation of New York as many as 467,500 acres suffered heavy damage from fire in 1904.

Relatively small was the fire-destruction in the northwestern coast forests, according to the investigations of the United States forest service, that of the Olympian peninsula amounting to only 112,500 acres, consisting wholly of conifer stands in the north and northeast portions. The interior of this wilderness has not yet been penetrated by white settlers. In the Canadian west, where already numerous miners, hunters, and lumbermen pursue their calling, conditions were the same as in the neighboring portions of the United States, and the fires of the current year in British Columbia have reached the same degree of destructiveness, and for similar reasons.

PURPLE BASKET WILLOW

By C. D. MELL

INTRODUCTION

AN EFFORT has been made in this paper to compile information dealing with the commercial value of the purple willow (*Salix purpurea* L.) and its most important varieties and hybrids commonly planted for the production of rods used in making furniture and basket ware. The success of a basket willow plantation depends upon the kinds planted as well as upon the system of management. The purple willow is more generally cultivated in this country than any other variety and yields material that is highly esteemed by the consumers of willow rods. In northern New York, Michigan, Wisconsin, and Minnesota it forms more than 90 per cent of the willows grown. A number of experiments with the purple willow were made by the Forest Service, United States Department of Agriculture, for the purpose of determining the most suitable system of management. Numerous private holtis throughout the eastern Central States were also investigated with a view to determine the varieties grown and to ascertain their soil and climatic requirements. The suggestions offered in this paper are therefore based partly upon the practical results of several years' tests in the experimental holt at Arlington, Virginia, and partly upon suggestions furnished by experienced growers in this country and abroad.

A great many common names have been given to this willow, and therefore it was considered advisable to select a name which should be given preference in future references. Although French osier is most commonly used by a large number of growers of basket willows, especially in New York State, it has been decided that a translation of the botanical name is more descriptive and appropriate. In order that the reader may determine what willow is referred to under the term purple willow, the following vernacular names are added which are often used by growers to designate this species: stone willow, common stone willow, Welsh willow, crab willow, osier, red osier, French osier, green-leaf osier, French willow, purple willow, common purple willow, bitter purple willow, and common basket willow.

BOTANICAL CHARACTERS

Purple willow has very distinct characters by which it may be readily recognized. The leaf blades are oblong to lanceolate or sometimes apatulate and broadest above the middle where they are more or less distinctly serrate; below the middle they are always entire. On the upper surface they are very smooth, of a rich shining purple and somewhat glaucous; on the under surface they are light-bluish green and often show a yellowish midvein. They are from two to four inches long and from one-fourth to three-fourths inch wide, and are sometimes arranged opposite on the slender, smooth and somewhat reddish (when young) shoot. The leaves of nearly all varieties of this group of willows turn black in drying. The petioles are very short and without glands. The stipules vary from linear to semi-linear, toothed, and

are very deciduous. The mature shoots have a smooth, yellowish gray bark and possess a number of appressed, obtuse, and generally glossy and occasionally red buds. The inner bark of the young twigs, especially during fall and winter, is orange yellow but toward the top becomes red. In poor soil and particularly in sandy soil the shoots have a yellowish color.

The catkins appear earlier than the leaves and are sessile, cylindrical and densely flowered. The male catkins at first appear purplish red, but during pollination become golden yellow, and after blooming brownish black. They are from half to two inches in length and about half inch in diameter. The bracts at the base of the catkins are small and leaflike. The small, round, concave scales are black in the upper half of the catkins and covered with hair; at the base they are red. The male flowers have a single stamen which is drooping and is formed by the union of the two filaments and anthers. The female catkins are purplish red; the fruit pods are densely tomentose and contain a single upright ovule. The empty cells of the brownish capsule recurve very strongly.

Willows are subject to considerable variation. The size, shape and surface of the leaves, their serratures, and the general characters and qualities of the rods vary greatly, depending upon soil and climatic conditions. The purple willow may be considered as a mean around which all its varieties are grouped. The constancy of these varieties is dependent upon the conditions which originally brought about the variations; when external conditions change, either those of soil fertility or soil moisture, changes in the character of the plant again take place, and the variety either reverts toward the mean, or, in its struggle to adjust itself to new conditions, gives rise to characters still more remote from the original form.

Hybrids are raised from different species and are generally considered not susceptible of propagation by seed. The terms hybrid, blend and bastard are limited to forms produced by cross fertilization. Some of the most important basket willows have been obtained in this way.

VARIETIES OF THE PURPLE WILLOW

The purple willow occurs in a great number of varieties which are more or less useful. The better ones yield the bulk of the rods used in the manufacture of wicker ware. They produce very thin, flexible, slender, cylindrical, and branchless rods. In Germany the twigs used for binding the vines are produced by varieties of this species. In selecting varieties for planting the kind of material furnished by them must be kept in view, since different varieties often differ very greatly. A number of them are good and persistent producers while others do not yield a full crop until the fourth year and diminish again after a few years.

The following varieties are recognized as the most important ones in this group:

Salix helix Smith (not L.). Rose willow; longleaf purple willow; green stone willow. Noethlichs, a German authority, gives a very favorable report concerning this variety and claims that there are two sub-varieties of this which are underscribed. The one has greenish-gray bark turning dark-green during the winter, while the other has pale rose-colored bark near the top of the shoots which are exceedingly slender, and its wood is heavier than of any other variety. The bark is rich in salicin and in Europe is also used for the production of tannin and coloring matter. This willow does not require a very rich soil and yet produces numerous long and slender rods.

Salix lambertiana Smith. Lambert's willow. This is a large-leaved variety with very beautiful catkins. It is the tallest among the purple willows

but is not praised very highly by growers in Europe. According to Pursh, it was introduced into this country very early for the production of basket willow rods. Owing to the graceful character of its slender shoots and glaucous foliage it is often planted for ornamental purposes.

Salix bractea rubra Koch. Red willow. The red brick colored scales of the catkins of this variety at once distinguishes it from the common purple willow that has black scales. It produces very long, straight and cylindrical rods, and in England is esteemed very highly. It grows in almost any soil, but in rich moist soil it yields an exceedingly heavy crop. It is used in certain parts of Europe for game coverts and fences. The rods are used for making willow ware requiring strength and durability.

Salix purpurea emendata Hort.* Noble willow. This variety is also easily recognized from the common purple willow by its thrifty growth and slender rods. It is planted extensively in Germany and the rods are used for all purposes in the manufacture of willow ware.

Salix purpurea kersii Hort.* English willow. The twisted leaves of this willow furnish a character that makes it easy to be distinguished from other varieties. Although this kind is equally as valuable as the noble willow, it is more often used for fences and hedges than for the production of basket rods. It produces numerous slender and branchless shoots after the second year.

Salix uralensis Hort.* Ural willow. This is a native of Galicia and is considered equally as good as the English willow and produces in dry soil, or in cold situations, a large number of very tough and slender rods. The first year after planting the shoots spread out considerably, but during the second year and thereafter they grow straight up to the height of 10 feet. The rods are almost perfectly cylindrical and for this reason this variety is often called cord or string willow. It has been grown in this country with very good success.

Salix uralensis serotina Hort.* Black Ural willow. In Europe this variety is often referred to as the late Ural willow, since it matures later and has smaller shoots than the Ural willow. It thrives in poor soils and unfavorable situations, but in this country it has been planted with only indifferent success.

Salix purpurea glauca Hort.* Blue green stone willow. In moderately fertile sandy soil this variety produces very thin and long rods which are in great demand among manufacturers of fine basket ware. It matures later in the fall than any of the other varieties and on this account is sometimes injured by frosts.

Salix purpurea gracilis Wimmer. Fine purple willow. This willow produces rods that are considered among the best in Europe, but the shoots frequently branch. It has been tested on a small scale in this country and found to make excellent growth with no side branches.

Salix purpurea pyramidalis Hort.** Pyramidal willow. In France where the pyramid willow is most widely cultivated it is known as Belle Josephina (*Salix purpurea josephina*). It is an excellent willow for hedges as well as for basket willow rods. It has been cultivated in Germany for more than sixty years.

Salix purpurea elata Hort.* High stone willow. This willow is known to have yielded a very good crop the first year after planting. It occasionally

*Horticultural varieties.

**J. A. Krahe, in his "Lehrbuch," page 104, states that this variety must be regarded as *Salix helix* Smith, but without first seeing both male and female flowers this can not be definitely determined.

produces shoots 6 feet long the first season; in height growth it approaches the Ural willow.

Salix purpurea sericea Wimmer. Silken-haired willow. In Germany the silken-haired variety is considered one of the most valuable and profitable basket willows. Its leaves while young are covered with a dense silky down which disappears at maturity.

Among other varieties* of the purple willow the following may be mentioned:

- Salix wisconsinensis* Cat.
- “ *malensis*
- “ *purpurea atropurpurea*
- “ “ *angustifolia*
- “ “ *macrophylla*
- “ “ *lutescens*
- “ “ *utilissima*
- “ “ *mirabilis*
- “ “ *graminea*
- “ “ *procumbens*

Hybrids of the Purple Willow

Salix viminalis x *purpurea* Wimmer. Common hybrid. This is the most important hybrid resulting from the cross fertilization of the white willow (*Salix viminalis* L.) and the purple willow. It belongs indisputably to the basket willows of the highest rank. The common hybrid possesses more characters of the viminalis group of willows than of the *purpurea* group. The rods are very long and more nearly uniform in length, though thinner than the white willow, but just as slender, smooth and flexible as the purple willow. Furthermore the bark is thin and peels easily. The wood is very tough and remains white for a long time after peeling. The rods split easily and can be planed without difficulty. The holt retains the vitality of the purple willow and is extensively planted in Europe.

Salix rubra Hudson. Rose willow. Another hybrid of the purple and white willows is recognized by its yellow anthers which are long and narrow and somewhat tapering at both ends; also by the leaves which are remotely serrated. If the leaves are green below and either smooth or with a few scattered hairs the hybrid is *Salix rubra* Hudson (*Salix helix* L.) including *Salix angustissima* Wimmer. A form with the under surface of the leaves more strongly pubescent or silken pubescent is segregated as *Salix claeagnifolia* Tausch.

Salix forbyana Smith. Forby's hybrid. An important cross between the white and purple willows that has more characters of the purple willow is Forby's hybrid. This hybrid differs from the purple willow in having more or less adhering filaments in the male flowers and the under surface of the leaves slightly pubescent. It differs from the white willow by its slender pistil, distinct leaf scars and the development of minute stipules. That it approaches the purple willow more closely is shown by its red anthers when young, and by the leaves which are broadest above the middle and the serratures on the upper half. They are blue-green and slightly pubescent below when young. This willow yields very strong and tough rods and is planted extensively in England for the production of posts, poles, stakes, and handles for implements.

*These varieties are mentioned in a number of German publications dealing with basket willow culture, but no reference could be found regarding their authors. It is likely that the majority of these have never been described and with suitable material a few could perhaps be shown to be identical with some of those cited above.

On account of its rapid growth it is also planted in Germany for rods to be used in wicker work.

Salix rubra populifera.* Langenauer blend willow. This hybrid originated at Langenau, near Mainz, in Germany, and is similar to the one mentioned above, except that it makes a more vigorous growth.

Salix rubra sessifolia.* Sessile-leaved blend willow. This willow originated in France and in rich soil yields a very large crop of rods. It is easily distinguished by its sessile leaves and by its reddish tinge of the young shoots.

Salix rubra viridis Greene. Red blend willow. This hybrid is cultivated extensively in the upper Rhine region, where it gives extraordinary good results and is highly esteemed as a basket willow of the first rank.

Salix pontederana Koch.** Pontedera's willow. This is the same as *Salix cinerea x purpurea* of Wimmer and is regarded as one of the most beautiful and robust basket willows known. Like that of *Salix purpurea gracilis* Wimmer, it develops numerous side branches which render this hybrid almost valueless.

Salix calliantha And. Beautiful flowered blend willow. Kerner described this willow as *Salix purpurea x daphnoides*. It is a very desirable basket willow and produces very long branchless rods. The catkins are very large and beautiful and the shoots are among the first of the basket willows to start growth in the spring.

Salix mauternensis Kerner. Mautern's blend willow. This hybrid corresponds exactly with Kerner's description of the characters of *Salix caprea x purpurea* Wimmer, and the horticultural variety *Salix discolor*. It is very productive and yields middling strong, branchless rods. In western Germany it is highly esteemed as a basket willow.

Salix doniana Smith. Don's blend willow. This willow was also described by Wimmer under the name *Salix repens x purpurea*. It is suitable for planting in dry soil but does not yield a large crop of rods.

Salix dichroa Doll. Double-colored blend willow. Doll's hybrid is also known under the name *Salix aurita x purpurea glaucescens* Wimmer. It is a hybrid that is considered a botanical wonder, and is more often planted for hedges and ornamental purposes than it is for basket willow rods.

ORIGIN, DISTRIBUTION, AND REQUIREMENTS

The purple willow is distributed through southern and middle Europe and extends northward into Sweden and eastward to Moscow. It also inhabits central Asia, but it occurs most abundantly along the Danube and in the valleys of the Alps. In the Bavarian Alps it grows at an elevation of 2,200 feet, and in the Tyrolean Alps at 4,800 feet above sea level. It occurs most abundantly along rivers and in moist places generally. On mountains over 4,000 feet elevation it seldom attains a height of more than 8 or 10 feet. At lower elevations it develops into a tree.

It was first introduced into this country by German emigrants, and is now the principal basket willow cultivated on a commercial scale. It is distributed throughout the entire region in which basket willows are now grown.

The purple willow is capable of enduring greater diversity of temperature than any other basket willow. Its natural range, as above stated, extends from Sweden south to Algeria and east into Asia. It is extensively cultivated in

*The authorities of these botanical names can not be determined except by further research.

**This species must not be confused with Willdenow's species of this same name belonging to the *Viminalis* group.



PURPLE WILLOW ONE YEAR OLD AT
FREDERICK, MARYLAND



PURPLE WILLOW ONE YEAR OLD
AT LAUREL, MARYLAND



PURPLE WILLOW NEAR COLOGNE, GERMANY



HYBRID WILLOW THREE YEARS
OLD, GERMANY

this country, where it has escaped and become widely and thoroughly naturalized. No detailed systematic census of its artificial range in the United States has been made, but it has thoroughly adapted itself to the varying climatic conditions from Maine to Nebraska and from Minnesota to Kentucky, Tennessee and Georgia. Doubtless, it will be possible to increase the area of its distribution considerably. The purple willow is perfectly hardy, and in locations where other varieties of basket willows have been injured by frost this one remained totally unharmed.

The purple willow demands more sunlight for its best development than any other basket willow. Its small, narrow leaves and its habit from spreading out from the stools in order to form an open stand show that it requires considerable air and light. It is least sensitive to shade in moist fertile soil, and becomes more shade-enduring as the stools increase with age. In dry soil it makes a rapid growth, provided, it receives sufficient air and sunlight. In plantations where the American green and the purple willow are planted alternately in rows 18 inches apart, the latter develops comparatively few shoots which grow up straight and rise above the dense and broad-leaved American green willow in quest of air and sunlight and the lower leaves drop off early in the season for want of sufficient light. Mixed planting in close ranks prevents the development of branches and stimulates height growth. The shoots grow up straight and remain thin and cylindrical.

The purple willow should be planted on southern exposures where it may receive the benefit of the hot rays of the sun, for its grows most rapidly during hot, dry weather with bright sunshine. Even in a dry soil it has made a height growth of 2 to 3 inches during a sunny day; in rainy weather for the same length of time the growth did not exceed one-half inch.

The soil best adapted for growing the purple willow is deep, fresh sandy loam; a soil yielding good crops of Indian corn also yields a profitable crop if willow is properly managed. It also thrives in well-drained, mucky soil if weeds are kept out. A few growers in parts of Massachusetts and New York claim that it can be grown with good profit on sandy upland. It has been grown for forty-three years on upland and the annual yield showed no decrease during all that time. It requires less soil moisture than most other basket willows. Although a deep sandy loam is best suited to the purple willow, a moist, sandy, clay soil oftentimes produces a very rapid growth, if the subsoil is loose and moist. The persistent efforts of many growers to propagate it on wet land have yielded results showing that it does not require wet soil. In upland it develops a great mass of rootlets to take up the available moisture. In well-drained locations the soil can be cultivated frequently and thus kept loose and aeriated. It is said that rods grown in wet loam are tougher and more flexible than those grown on rich, fertile uplands, but this has not been fully substantiated.



THE APPALACHIAN FORESTS

Putting the New Law Into Operation

THE new national forest law calls into action several official agencies, but the initiative in the purchase of land as well as the consummation of such purchase when authorized rests with the Department of Agriculture which, of course, acts through the Forest Service. The Service has made very complete arrangements for an efficient carrying out of the full intent of the law. Assistant Forester William L. Hall, who conducted the investigation in the Southern Appalachian and White Mountains under the \$25,000 appropriation in 1907, and is therefore well fitted for the task by personal knowledge of the conditions in both sections, has been recalled from Madison, Wisconsin, where he has been in charge of the branch of forest products since the opening of the new laboratory last year and has been put in charge of the work of establishing the new national forests. McGarvey Cline, who was Mr. Hall's second in command at Madison, has been put in charge of the branch of forest products with headquarters at that place.

Mr. Hall has already established his office in Washington and is at work on the great and responsible task in which so many people in so many states are interested. For reasons which were mentioned in AMERICAN FORESTRY last month the White Mountain situation is being especially studied, but the southern mountains are also being districted and undergoing preliminary examinations and offers of land are being received and considered from several of the states which have passed the necessary enabling act.

In this matter of offers of land, the need of public spirit on the part of land owners cannot be too strongly emphasized. Here is an enterprise which has been urged for the public good. The unselfishness of its advocates has been repeatedly and sincerely affirmed. Now comes the actual test of citizenship. Will those who hold the lands recognize the public necessity, as Congress has somewhat reluctantly done, and meet the government half-way? Or will they hold their property for impossible prices and thereby delay and obstruct the development of this great enterprise?

The correspondence received thus far, while considerable, is not sufficient to answer these questions. When the circular explaining the plans and methods of the government has been thoroughly distributed fuller indications will doubtless appear. Thus far there have been several moderate offers made from both north and south, and some impossible ones. One proposal was made to sell the government a tract, not of the highest timber value, for seventy-five dollars an acre, which was about eight or ten times other offers that represented quite as great a value. Owners who hold at such figures may as well save their paper and postage. Such offers cannot be considered.

It has been hoped that some owners of means might make gifts of land to the government, as Mr. Harriman did to the state of New York. This is

a good cause, a great public cause that will hand down large benefits to posterity and tend to preserve the prosperity of our civilization. It is certainly a good object for public-spirited givers. It is a cause that is sufficiently in the public eye to satisfy those who like to have their giving known of men, and it has the enduring quality of a monument. Forest lands, given to the nation to preserve and maintain, will stand for all time as reminders of the good will of the giver to his country and to those who come after him.

Admitting, however, that those who may be able to be thus generous are few, the attitude of those who sell the land to the government, as they compose a far more numerous class, is much more important. If they meet the officials half-way with good offers at fair or low prices, it will assist greatly in the early and successful establishment of the forests. The appropriation will not be sufficient to purchase half of the land that is needed for the purpose of the act. Let us urge owners, then, not to try to speculate in the needs of the people, but to help make this money go as far as possible. It is not a gift from some invisible source that is going into the purchase of these lands. It is our money that is being spent and it is for the interest of the seller of the lands as it is of everyone else that it be used to the best advantage. To make this new policy a success, the same full and interested cooperation that secured the enactment of the law is necessary. No close-fisted policy, or attempt to make money out of the government, or unload useless property at high prices, will pay in the long run. In most cases cut-over lands stand the lumber companies practically nothing. They bought the stumpage, and having secured it they have no further interest in the land. Such tracts the government should be able to obtain at a nominal figure, leaving larger amounts to put into protective forests where the standing timber must be purchased and largely retained.

No hard and fast policy in regard to purchase can be laid down in advance. For the beginning at least each case must be considered on its individual merits. Perhaps when the nuclei of the necessary forests have been developed, the policy of rounding out and completing may appear more clearly.

Mr. Hall believes that there are great possibilities in that section of the bill which provides for national and state cooperation for fire protection. Under the terms of this provision the government may expend for fire protection an amount, not exceeding the amount appropriated by the state for the same purpose, in any state which has provided by law for a system of forest fire protection. Three or four states, notably New Hampshire and Vermont, are already planning to come in under this provision and the organization of the forest service in these states is such as to entitle them to the benefit of its provisions. Mr. Hall confidently believes that the passage of this law will lead to the suppression of forest fires in the eastern United States within a few years.

Last month a summary was published of the announcement of the Forest Service with reference to the purchase of land under the Weeks law in the Southern Appalachian and White Mountains. This announcement has been printed as a circular for general distribution and copies can be had by application to the United States Forest Service. The circulars are accompanied by blank forms for submitting proposals of land and include the text of the Weeks law. The circular, issued under date of March 27, 1911, will be of interest to readers of this magazine and is reproduced here:

PURCHASE OF LAND UNDER THE WEEKS LAW IN THE SOUTHERN APPALACHIAN AND WHITE MOUNTAINS**GENERAL INFORMATION**

The act of Congress approved March 1, 1911 (Public, No. 435), created a National Forest Reservation Commission and authorizes the acquisition of lands on the watersheds of navigable streams for the purpose of conserving their navigability. The Secretary of Agriculture is authorized and directed to examine, locate, and recommend to the Commission for purchase such lands as in his judgment may be necessary to the regulation of the flow of navigable streams, and he is authorized to purchase, in the name of the United States, such lands as have been approved for purchase by the National Forest Reservation Commission at the price or prices fixed by said Commission. The full text of the law is to be found on page 7.

The general purpose of this law is to secure the maintenance of a perpetual growth of forest on the watersheds of navigable streams where such growth will materially aid in preventing floods, in improving low waters, in preventing erosion of steep slopes and the silting up of the river channels, and thereby improve the flow of water for navigation.

While the improvement of the flow of navigable streams is the fundamental purpose, other benefits incidental in character but nevertheless important will be kept in view. Among these are (1) protection against disastrous erosion of the soil on mountain slopes and against the destruction of the soil and soil cover by forest fires; (2) preservation of water powers, since, like navigation, they depend for their value upon the evenness of streamflow; (3) preservation of the purity and regularity of flow of the mountain streams, with a view to their use for the water supply of towns and cities; (4) preservation of a timber supply to meet the needs of the industries of the country; (5) preservation of the beauty and attractiveness of the uplands for the recreation and pleasure of the people.

Aside from its application to the watersheds of navigable streams, the law is not restricted to particular regions, except that lands may be purchased only in the States whose legislatures have consented to the acquisition of such land by the United States for the purpose of preserving the navigability of navigable streams. The States which have passed such legislation and in which purchases are now contemplated are: Maine, New Hampshire, Maryland, Virginia, West Virginia, North Carolina, Tennessee, South Carolina, and Georgia.

The sources of the navigable streams which have their origin in the Rocky Mountains or the mountains nearer the Pacific coast are already to a large extent protected by national forests. The Appalachian Mountains, including the White Mountains, are for the most part without such protection. Because of their altitude, steepness, and lack of protection they are in a class by themselves in their need for the action authorized under this law.

The first lands to be examined for purchase will therefore be in this region. The area needing protection in the Appalachians is very large. It is far larger than can be purchased with the funds appropriated under this law. Much difference exists, however, in the character of the lands in different parts of the region. Mountains are higher, slopes steeper, rainfall heavier, and the soil more easily washed in some sections than in others.

Careful examinations made during the past 10 years in practically all parts of the Appalachian region have proven that the conditions which affect streamflow to an extreme extent are to be found in relatively limited areas. These areas are scattered more or less widely. By careful selection of the tracts it will be possible to do much for the permanent improvement of the watersheds by the purchase of only a part of the mountainous region.

Within these areas not all, and in some cases not a very large proportion, of the land will be needed by the Government for the purpose in view. Just what lands should be purchased will be determined in every case as a result of a careful examination.

Some of the important areas are already known, and the purpose of this circular is to invite proposals for the sale of lands within them. A list of such areas is to be found on page 4, and a blank form and an official envelope to be used in making proposal for sale accompany this circular. Additional copies of the blank may be had upon application to the Forester, Forest Service, Washington, D. C. The blank should be accurately and fully filled out and mailed, securely sealed in the envelope. If possible, a map showing the boundaries of the tract should be submitted with the proposal for sale. If the proposal is satisfactory, the Secretary of Agriculture will expect the owner to execute to him an option on the land for a reasonable length of time.

Lands of the following classes will be considered for purchase when they lie within a designated area: (1) Timbered lands, including both land and timber; or the land, with the timber reserved to the owner under rules of cutting to be agreed upon at a

time of sale; (2) cut-over or culled lands; (3) brush or burned land not bearing merchantable timber in quantity, but covered with a growth of brush which is useful for watershed protection, and burned land whether covered with young timber growth or not; (4) abandoned farm land, whether remaining cleared or partially covered by timber growth. Good agricultural lands will not be considered.

Where valuable mineral deposits are known to exist, the right to remove such deposits may be reserved to the owner, under conditions to be agreed upon, such conditions to be incorporated in the written instrument of conveyance.

Lands lying within the designated areas can not be recommended for purchase unless examination by the United States Geological Survey shows that their control will promote or protect the navigation of streams on whose watersheds they lie.

Lands proposed at exorbitant prices will not be considered. The holding of land at too high a price in any of the areas will prevent the Government from undertaking purchases within it.

No limitation is put upon the size of tracts to be proposed for sale. Proposals will be received for small as well as for large tracts within the areas designated, but small tracts can only be examined when they lie adjacent to or near large tracts which are being examined or where the aggregate of all tracts offered for sale is sufficient to justify an examination.

The right of any landowner to deal through an agent is, of course, recognized. The placing of lands in agents' hands, however, is unnecessary, as the owners themselves may deal direct with the Government.

The lands purchased by the Government under this law are to be included in national forests. Such forests will in no way interfere with hunting and fishing within the areas. The laws of the States in which the forests are located will apply as at present and the forests will be open to anyone and everyone. The use of the forests for all reasonable purposes, including recreation, will be encouraged.

In general the procedure in making purchases will be as follows:

- (1) The filing of proposal for sale of land by the owner or owners.
- (2) Examination of lands. This examination will usually include a careful estimate of whatever timber is standing upon the tract, an estimate of the value of the tract as a whole for the production of timber, and the determination of its importance in regulating the flow of navigable streams.
- (3) Approval of lands for purchase by the National Forest Reservation Commission and the fixing of the purchase price or prices. Approval for purchase is given only after recommendation has been made by the Secretary of Agriculture on the basis of the field examinations.
- (4) Final negotiations with the owner or owners of land as to terms of sale.
- (5) Examination of title.
- (6) Actual conveyance of the title of the land by the owner to the Government and payment therefor by the Government to the owner.

AREAS WITHIN WHICH PROPOSALS FOR SALE ARE INVITED.

The areas roughly designated in the following descriptions have been selected as those within which proposals will first be invited. Lands chiefly valuable for agriculture are not desired, and where such lands occur within the areas described they will not be recommended for purchase, unless such lands occur in such small scattered areas that their exclusion would be impracticable.

White Mountain Area, New Hampshire and Maine.

Lands on the Carter-Moriah Range of mountains in the townships of Shelburne and Gorham, on the Presidential Range in the townships of Gorham and Randolph, on Cherry Mountain and the Dartmouth Range in the township of Carroll, and lands in the Low and Burbank Grant, Thompson and Meserve Purchase, Bean Purchase, Martin Location, Green Grant, Pinkham Grant, Bean Grant, Cutts Grant, Sargent Purchase, and Hadley Purchase, in the county of Coos in the State of New Hampshire; lands on the Franconia Range of Mountains, the Little River Mountains and the Rosebrook Mountains in the township of Bethlehem, the Franconia Range of Mountains in the townships of Franconia and Easton, on Mount Moosilauke, Mount Kineo and Mount Carr, in the township of Warren, on Mount Carr in the townships of Wentworth and Rumney, and Black Hill and Mount Kineo in the township of Ellsworth; lands above an altitude of 1,000 feet in the township of Woodstock; lands east of the Pemigewasset River in the township of Thornton; and lands in the townships of Benton, Waterville, Lincoln, and Livermore in the county of Grafton in the State of New Hampshire; lands above an elevation of 1,000 feet in the townships of Chatham, Jackson, Bartlett, and Albany, and on the Sandwich Range of Mountains in the township of Sandwich in the county of Carroll in the State of New Hampshire; and lands in Batchelders Grant in the county of Oxford in the State of Maine.

Youghiogheny Area, Maryland.

Lands in Garrett County, situated on the main watershed of the Youghiogheny River between the towns of Oakland and Friendsville, west of Hoopole Ridge and Negro Mountain.

Potomac Area, Virginia and West Virginia.

Lands in Virginia situated in Shenandoah County west of Stony Creek and Little North Mountain and south of Capola Mountain; lands in Rockingham County west of Little North Mountain and north of Slate Springs and Rawley Springs; lands in West Virginia in Pendleton County east of Moorefield River and north of Little Fork; lands in Hardy County east of Moorefield River and south of North River.

Monongahela Area, West Virginia.

Lands situated in Randolph County, on the watersheds of Dry Fork, Laurel Fork, Gladly Fork, and Shavers Fork, and on the watersheds of the eastern tributaries of Valley River south of the town of Elkins, and on the watershed of the West Fork of Greenbrier River; in northern Pocahontas County, lands situated on the watershed of Greenbrier River west of East Fork and Deer Creek, and north of the junction of the Greenbrier River and North Fork; and the lands on the upper watersheds of Shavers Fork of Cheat River.

Massanutten Mountain Area, Virginia.

Lands in Rockingham, Shenandoah, Warren, and Page Counties, situated between the North and South Forks of Shenandoah River, comprising in general Massanutten Mountain north of McGaheysville post office and south of Waterlick post office.

Natural Bridge Area, Virginia.

Lands situated on the Blue Ridge and outlying mountains in Northern Bedford County; in Botetourt County east of Buchanan and south of the James River; and in Rockbridge County south of the James River.

White Top Area, Tennessee and Virginia.

Lands comprising the main ranges of the Iron Mountains in northeastern Johnson County, Tenn., and eastward through Washington, Smyth, Grayson, and Wythe Counties, Va.

Yadkin Area, North Carolina.

Lands in Wilkes, Caldwell, and Watauga Counties, situated on streams flowing into the Yadkin River from the north lying west of the post offices of Louis Fork, Purllear, Mulberry, and Hall Mills.

Mount Mitchell Area, North Carolina.

Lands in Buncombe County situated on the Great Craggy Mountains; lands in Yancy County situated on the Black Mountains and South Toe River watershed south of the post office of Micaville; lands in McDowell County situated north of the main branch and west of the North Fork of the Catawba River; and lands in southwestern Mitchell County south of Brush Creek and West of Mica post office.

Smoky Mountain Area, North Carolina and Tennessee.

Lands in North Carolina situated in Haywood County north and west of Jonathan Creek and west of Pigeon River below the mouth of Jonathan Creek; in Swain County north of the little Tennessee and Tuckasegee Rivers; lands in Tennessee in Cocke County south of Denny Mountain and the Big Pigeon River; in Sevier County south of Chestnut Ridge, Galtinburg post office, and Cove Mountain; and in Blount County south of Round-top Mountain and Tuckaleeche post office and east of Hesse Creek and Abram Creek.

Pisgah Area, North Carolina.

Lands situated in Jackson County north of Little Hogback Mountain, Laurel Mountain, Sheep Cliff, and Shortoff Mountain, and east of Buck Knob, East Laport post office, and Carver Mountain, and south of the Asheville and Murphy Branch of the Southern Railroad; lands in Haywood County south of Pinnacle Knob, Snaggy Ridge, and the post offices of Three Forks, Cecil, Retreat, and Cruso; lands in Buncombe County south of Dunsmore post office and Stony Knob; lands in Henderson County west of Seniard Mountain and Buck Knob; and lands in Transylvania County north of the Hendersonville and Lake Toxaway Branch of the Southern Railroad, and Lake Toxaway, and west of the Boylston Creek.

Nantahala Area, North Carolina and Tennessee.

Lands in North Carolina in Swain County west of Little Tennessee River; lands in Macon County on the Nantahala Mountains and the watershed of the Nantahala River; lands in Clay County on Valley River Mountains, Tusquitee Mountain, Vineyard Mountain, and Chunky Girl Mountain; lands in Cherokee County on Valley River Mountains, Snowbird Mountains, and Unaka Mountains; lands in Graham County south of the Little Tennessee River; lands in Tennessee in Monroe County south and east of Salt Spring Mountain, Sassafras Mountain, and on the watershed of Tellico River above the mouth of Wild Cat Creek.

Savannah Area, Georgia and South Carolina.

Lands situated in Rabun and Habersham Counties, Ga., and in Oconee County, S. C., on the watershed of the Chattooga River above Ramsey Ferry; in Oconee County, S. C., on the watershed of the Chauga River; in Rabun County, Ga., on the watershed of the Tallulah River, south of Plumorchard Creek; in Habersham and White Counties, Ga., on the watersheds of Soque and Chattahoochee Rivers north of Pinnacle Mountain, Grimes Nose, and Yellow Mountain.

THE CRAWFORD NOTCH

OUR frontispiece this month is a picture of the Crawford, or White Mountain, Notch in New Hampshire, looking south from Mt. Willard. The New Hampshire legislature has just authorized the purchase of the Notch, including about twelve thousand acres, for a state forest reserve. This deep valley, with its rugged and precipitous mountain walls and the tumultuous Saco plunging down its floor is one of the grand spectacles of the White Mountain country, and is the main pass into the heart of the mountains. It was discovered by Timothy Nash, a hunter, in 1771, and soon afterwards a road was built through it and it became the main highway between the northern and southern settlements of New Hampshire. The road runs along the tree covered floor of the valley and is much traveled by carriages and automobiles in summer. The railway runs along the western mountain side several hundred feet above the valley and from it the best views of the Notch are obtainable. The Notch proper extends from the Gate, a picturesque break in the rock wall, on the north near the Crawford House, for about three miles, dropping over six hundred feet in that distance. Then southward the valley gradually widens until it finally spreads out in the Conway intervalles. The forest which covers the valley floor and the mountain side of the Notch is not of the highest value commercially, but is of great scenic value to the Notch. It was about to be cut off when measures were taken to have the Notch purchased by the state. Hitherto it has not been a tempting ground for lumbermen because of the difficulty of lumbering on its steep mountain sides.

EDITORIAL

A NEW OPPORTUNITY

ELSEWHERE in these pages a suggestion is made of an opportunity now open to forest land owners in the Appalachian region to do a great public service by the gift of lands to the United States for the new eastern national forests. We may enlarge upon this by calling attention to the new and broad field for public benefaction the development of forestry in this country offers. We are living just now in an age of liberal giving for the public good. Schools and colleges, hospitals, scientific research, the promotion of the public health, the advancement of the peace of the world—all these are receiving assistance from our men and women of wealth to an extent unparalleled in the history of the world. As yet, notwithstanding the growing popular interest, forestry has not come into general recognition by those who are looking for ways and means to promote the welfare of society. Yet here is a field which as it comes to be better understood must be recognized as having a strong claim upon our generous givers.

A few have already seen the need and the opportunity. The late James W. Pinchot, and his distinguished son, Gifford Pinchot, were naturally among the first, for they had both the knowledge and the means. The late E. H. Harriman, through his gifts to New York, Mrs. Harriman and Mrs. Sage, through their gifts to the Yale Forest School, the group who provided Harvard University with the forest in Massachusetts for the work of the forestry department, and some others in lesser degree, have set the example; but the opportunity is big enough for much wider recognition.

There are the schools of forestry, many of which are doing admirable work, that could be greatly strengthened by the providing of larger funds and demonstration forests. Then there is the practical work of the national government and of the states, all of which is the people's work. We have suggested how the national government may be aided at the present time. In a similar way the work of the states can be advanced by financial aid on a generous scale. To be sure this, like all of our government work, must be sustained chiefly by the taxes contributed by all of the people; but forestry is peculiar in its needs and opportunities and at the present time these outrun the means or inclination of most of the states to meet them and there is no reason why endowments of forest lands and permanent funds for fire protection and other work in connection with their maintenance should not be bestowed upon the states, as endowments are bestowed upon so many semi-public institutions for all sorts of useful purposes. The time will ultimately come when forest work in this country will be self-supporting, but owing to the great area of the country and to the present undeveloped conditions of our forest resources, this point has not been reached and the interim can be bridged and the practicability of forestry can be better shown if given private assistance.

Finally, there are the forestry associations—the American Forestry Association, and those of many of the states which are doing a broad and useful popular educational work, most of them with insufficient funds which are eked out by the sacrifices of many unselfish workers. Endowments sufficient to

maintain the fixed charges of these organizations, or to carry on special lines of work which they have the opportunity, the knowledge and the desire to develop, would enlarge their usefulness and enhance their efficiency, making them more than ever real forces for the national welfare. In the case of these associations these endowments should not be large enough to put them beyond the need of popular support, in which lies their strength; but to put them in such a position that their activities need not be crippled and limited by entire dependence upon the necessarily small income from popular membership.

This suggestion is offered for careful consideration and investigation by those who have under consideration the opportunities that may be open to them for promoting the public welfare and the permanent prosperity of our people. The nature of forestry is peculiar. It is at once a business proposition and a public service work which entails some sacrifice of immediate business returns. For this reason it can better reach its full development if assisted, this assistance being an offset to the financial sacrifices which make men hesitate to practice it from a purely business standpoint.

A FLANK ATTACK

Editor AMERICAN FORESTRY,
Washington, D. C.

Dear Sir:

I have noted various comments regarding the effect that the amendment to the Agricultural Appropriation bill, proposed by Senator Heyburn in the closing days of the last Congress, would have upon national forests and national forest conservation. Knowing that the Senator has been a consistent opponent of the national forestry policy, I should assume that an amendment which he would propose would certainly not be helpful; yet I should like to have you state for the benefit not only of myself but of multitudes of your readers who are not so closely in touch with the situation as you are, the words of the amendment and show why limitation of the Forest Service work to areas growing 4,000 feet or more to the acre would be harmful.

Respectfully yours,
"INQUIRER."

THE national forest system is too firmly entrenched to be openly assailed but it is still subject to flank attacks by those who realize the impossibility of securing a victory over it in the open. The Heyburn amendment to the agricultural appropriation bill, offered in the Senate at the last session of Congress, and thrown out on a point of order, provided for the elimination from the national forests of all land, in 160-acre tracts, containing an average of less than 4,000 feet of timber per acre. It might properly have been called an amendment to emasculate the national forests and was doubtless so intended by the author, whose perceptions, although somewhat slow on many subjects, are quick enough to see an opportunity to weaken the United States Forest Service and the national forest system. The proposed amendment was a shrewd move in that its real character would hardly be seen by one unacquainted with the conditions obtaining in the national forests. Let us see what the effect of the proposed elimination would be.

In the national forests there are three classes of lands which would be materially affected by the amendment: (1) extensive areas of chaparral in the southwest which can never grow merchantable timber but which are needed for the protection of watersheds. These are maintained by the government because of their conserving effect upon streamflow. They can never be a

source of income, but as long as they are protected they will be of great benefit to the regions in which they lie. (2) Areas covered with juniper, pinon and scrub oak which do not carry four thousand feet to the acre but do maintain a valuable supply of mine timber and wood for domestic use. It would be a serious injury to the country in which these are found to have them cut over and yet they have no considerable commercial value and the government is doing a service to the localities in maintaining and protecting them. (3) There are further extensive areas of half-grown and scattering growth, useful, yielding some return and having a protective and an increasing commercial value. These, of course, would have the protection of the government removed by the adoption of a provision like the Heyburn amendment.

Then there are burns found in patches through all the forests. Some of them are open grass lands. In many one hundred and sixty acre tracts these would be sufficient to lower the average timber stand per acre so as to throw out the whole tract, even though much of it might contain good commercial timber. These open tracts which have carried forests are potential forest lands but they are not bearing their four thousand feet of timber and the amendment would throw them out.

All lands undergoing or awaiting reforestation, natural or artificial, would be eliminated, although one of the most important elements of the forests. Likewise lands from which timber sales have been made, since the stand is usually cut down below four thousand feet, would be lost to the forests.

To remove all these classes of land would reduce the area of the national forests by millions of acres, but this is not the worst result of such a drastic course. Tracts in the classes we have described, together with bare mountain tops and other intervals in the forest growth, would make the national forests things of shreds and patches, impossible of administration. Consider for example the important problem of grazing control which is now being so well worked out. This could no longer be maintained if the national forests were disintegrated. Conditions would be produced which existed in some degree when the forests were first forming. It has been the study of the Service to consolidate and perfect the forests as administrative units. The results of this constructive work would be lost permanently if such a plan as that of the senior senator from Idaho should carry.

To describe its consequences shows the absurdity of such legislation and we do not believe there is much danger of such action being taken; but it is the kind of insidious attack which requires publicity to insure its defeat, and there is always a chance that some proposal of the kind will be advanced when legislation is being rushed through and there is little time to expose it. This warning seems all the more necessary since there has already been introduced into the present Congress a House joint resolution providing:

That the President be, and he hereby is, authorized and directed to eliminate all nontimbered agricultural lands from the forest reserves, from reclamation projects where there is no immediate prospect of such lands being used for reclamation purposes, and from withdrawals for power sites where such withdrawals are excessive, and to restore such lands so eliminated to entry under the homestead laws.

The author of this resolution which aims in less explicit terms at the same end as Senator Heyburn's amendment, is Mr. Lafferty, a new representative from Oregon, who came in under the progressive banner, which proves that forest conservation cannot depend upon the progressives for loyal and intelligent support. Representative Lafferty is also the author of a bill for turning over to the states in trust the national forest lands. This measure we shall consider at a later time, but the resolution above cited is too near the color of the Heyburn amendment to be passed over in this connection.

It must always be remembered that the Government has a great public service work to do with the national forests. It is not simply a question of maintaining great timber producing forests, it is a question of maintaining stream flow, of irrigation, of climatic conditions, of health and prosperity for the people which in many cases demand national expenditure without corresponding returns. This work is a great task of applied science and is necessarily placed in the hands of experts. To allow it to be demoralized for political purposes or private profit, which the Heyburn amendment or the Lafferty resolution would accomplish would be a crime against humanity.

THE PASSING OF THE PIONEERS

YOUNG as the forestry movement in America is, it is already old enough to begin to note the passing away of some of its veterans. While most of its active professional workers are young men with years of usefulness ahead of them, there are others to whom it owes a great debt—men who while not professionally concerned with forestry have had the foresight and the understanding to realize, in advance of general public intelligence, the significance of forestry, the relation of trees to man and to civilization; and who gave to that thought years ago their interest and their unselfish effort. To them as pioneers and advocates is due the advanced state of the movement today, and their names should be writ large in its history and remembered always for a great public service.

A few months ago William Henry Brewer, for thirty years Norton professor of agriculture in the Sheffield Scientific School of Yale University, joined the great majority, full of years and honors. Professor Brewer was one of a type of scientific men none too common, whose range of vision went far beyond any specialty. The late Professor Shaler of Harvard was another of the same type. These men looked deeply into many things. Their minds were in the highest degree constructive. Their thought saw the relation of different fields of science and coordinated them. Both of them knew their country as few men have known it. They traveled over it, searched its hidden recesses, studied its resources, and appraised their value and their interdependence with keen insight. Professor Marsh, also a Yale man, was another of this broad-minded type of scientific thinkers and his contribution to forestry is well known and still classic. Professor Brewer was not a writer so much as a teacher and inspirer of others, and so his work for forestry is less known to the public except to those who came in contact with him and derived suggestion and inspiration from that contact. In this way his influence was great, and he must be reckoned as one of the chief promoters of the great movement which is becoming a distinct part of our economic life and finding its place in applied science as well as in the sentiment of the people. He was one of the committee appointed by the government from the National Academy of Sciences to investigate the condition of the forests of the country and to formulate a plan for their maintenance and increase. The work and recommendations of this commission were largely responsible for the formation of the present United States Forest Service. He was a member of the governing board of the Yale Forest School and for several years was a lecturer of the school on forest physiography.

Since the April number of AMERICAN FORESTRY went to press, another veteran worker whose service was intimately connected with the beginnings of the American Forestry Association, has left us. Judge Warren Higley, who died in New York on the 24th of March, after an active and honorable educa-

tional career of over ten years entered upon the practice of law in Cincinnati in 1874 and in that city, in 1882, became one of the founders of the American Forest Congress. This body became a few years after the American Forestry Association, and Judge Higley was its president in 1885-6. Through the remainder of his life he took an active interest in the forestry movement and gave his assistance to it in generous measure. He was until the last three or four years a regular attendant at the annual meetings of the American Forestry Association and a particularly intelligent and interested participant in its activities. He was a founder of the Association for the Protection of the Adirondacks, which has accomplished so much in preventing the destruction of New York's noble forest domain.

No one who knows the history of the American Forestry Association and the extent and value of its achievements, can fail to honor the loyalty and courage of the faithful few, of whom Judge Higley was one, who through years of public ignorance and difference maintained the worth of their cause until the country was compelled to recognize and incorporate it in a great national policy.

American citizenship as well as American forestry is better for such men and their work.

PLANTING FOR PULP AND TIMBER

AUSTIN F. HAWES, state forester of Vermont, has an article in *Paper* of March 29th on the planting of forests for pulp and timber, which should be helpful, as it is practical and conservative in tenor. His opening sentence strikes the keynote: "Prices of soft-wood lumber and pulp wood are now getting so high that forest planting of quick growing species is a sound business policy under certain conditions." He qualifies this, however, by saying that "it is useless to advocate the investment of money in the purchase and reforestation of waste lands on a large scale at present because so much better and quicker producing investments can be made in natural second growth."

In many cases in New England and northern New York, lands can be purchased from which soft woods have been culled but covered with a vigorous second growth of fir, spruce or pine at prices that in a few years will yield a handsome profit, yielding more in fifteen years than the average plantation at thirty years. There are other conditions, however, in which forest planting is advisable, as on non-productive lands such as abandoned farm pastures. Lumber and pulp companies buy much property containing such tracts and as they buy on the basis of the timber value, the open land is virtually free, so that planting can be done for the cost of seedlings and labor. The reduction of the fire risk in the eastern states by better systems of protection, Mr. Hawes points out, is removing the chief risk attached to such investments, and the young, growing trees steadily enhance the value of the land. He gives the following reasons why pulp companies should plant:

- (1) They have extensive plants which must be supplied from the tributary region.

- (2) They own large areas of waste land representing little investment.

- (3) The materials used are not required in large dimensions; and are of soft, rapid growing species, so that a crop can be secured in the minimum length of time.

Mr. Hawes discusses species and ways and means quite fully, suggesting the value of Norway spruce and Canadian or white spruce, and white pine,

the character of the soil determining the variety that is best adapted in each instance. He recommends the use of seedlings as, in the long run, cheaper and more satisfactory than growing from seed, and describes concisely approved methods. A table of the cost of planting one hundred acres shows the average cost per acre to range from \$6 to \$9.50, according to the cost of labor and seedlings. These figures are based on the actual experience of the Vermont Forest Service and of the International Paper Company on its work in Vermont and New Hampshire. He cites actual results from white pine plantations in Connecticut which have grown with practically no care, comparing them with two plantations of American white pine in Germany which have received the careful management characteristic of the planted forests of Germany. The results are naturally slightly in favor of the German forests, but Mr. Hawes believes that so far as soil is concerned there is no reason why we should not attain as good results as the European foresters, and that the difference is solely due to the management of the plantations.

This article is interesting as suggesting the considerations that must enter into the problem of planting by American land owners. Like many other forestry questions that are so new to our people, this has been frequently discussed in too general a way and the statements made have not given due consideration to all the factors involved in the problem. As we have urged frequently, the time has now come when these problems must be studied with close regard for all the factors that go to make up the sum of the result. Recently when seeking for articles on certain phases of tree planting for AMERICAN FORESTRY we found one or two foresters who were inclined to decry the whole idea of forest planting as being worthless for our conditions. It seems to us that their position is an extreme one which has been taken without due consideration and as a result of an excess of enthusiasm for planting shown on the other side. However, this may be there can be no question that, although it is far from being all there is in forestry, planting has a place of increasing importance in our forestry operations, especially in our more thickly settled states.

THE CRAWFORD NOTCH SAVED

The passage by the New Hampshire legislature of the bill providing for the purchase by the state of the Crawford Notch is a triumph that so far as the state itself is concerned is on a par with the passage of the Weeks bill by Congress. The Crawford Notch purchase will institute a state policy in harmony with the new national policy that should ultimately make of the White Mountain country a great combined state and national forest protected from fire, its forest crops carefully husbanded, its scenic values preserved—a never failing source of health and wealth to the people.

The final passage of the bill in both houses by a unanimous vote would make us wonder at the delay and at the doubt as to its final success if we did not know the devious ways by which legislatures reach their conclusions. Evidently its friends did effective work, and Governor Bass, whose influence was felt throughout in behalf of the bill, has made himself already a force to be reckoned with. There was objection to the original appropriation of one hundred thousand dollars and as finally passed the amount to be paid was placed at the discretion of the governor and council, a much more business-like arrangement.

We congratulate the state and the Society for the Protection of New Hampshire Forests, and we congratulate the thousands of people who annually enjoy the rugged beauty of this noble mountain pass.

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Notes on Recent Publications

The Arbor Day Annual for 1911 issued by the Education Department of the state of New York is an attractive, interesting, and instructive pamphlet, and decidedly out of the ordinary among publications of its class for the scope and value of its contents. The opening article is by Andrew

S. Draper, commissioner of education, on "Arbor Day and Forestry." There are also articles on the forests of the state, the lumber industry, and European forestry, the latter by Professor Toumey, of the Yale Forest School. Much useful information is also included. The suggested outline for the use of teachers is excellent as far as it goes, but there are some omissions which can easily be filled in. The general scheme as given will put any interested and capable teacher on the right track. A similar comment may be made on the bibliography, which contains some strange omissions. Nevertheless the teacher or student who uses these helps will soon be guided to the more complete bibliographies. If every state issued an annual like this Arbor Day would acquire a real educational value which it now generally lacks.

Field and Stream, the official organ of the Camp-Fire Club of America, began in November, 1910, the publication of a valuable series of papers by its editor, Warren H. Miller, on "European Forestry." Mr. Miller writes from an experience of several years in the German, French, and Swiss forests, and treats the subject from the point of view of American conditions and needs. General conditions, forest management, the selective forest and standard coppice, the forestry nursery, reforestation, and applications to American practice are the topics that have been so far treated.

The articles are to appear in book form after their serial publication is completed.

The Annual Report of the State Forester of Massachusetts deals, as usual, with the two divisions of general forestry and gypsy and brown-tail moth suppression. The important phases of the work of this state service have been noted from time to time and the report does not, therefore, call for extended review. Governor Foss has recently had an investigation made of the forest service and has made recommendations, some of which are likely to be highly detrimental if carried out. One of these is to combine the forest service with the fish and game commission. In view of the fact that the Massachusetts Forest Service has been built up as an independent service, and the organization of the fish and game commission is so different, and its work so different, it does not seem, even if there is need of a change in the forest service, that it should be made in this way. This seems to be one of attacks which are frequently made upon the service, less for its own good than for the exploitation of the ideas of people more or less inimical to it. The governor is undoubtedly sincere in his purpose but he is said to be overworking and has probably not given sufficient study to the matter or has been badly advised. That some changes are needed may be admitted, but they should be made in the right way.

NATIONAL FOREST WORK

Appropriation for the Forest Service

The total appropriation for the Forest Service for the fiscal year ending June 30, 1912, is \$5,533,100. Of this the salary list of regular employes fixed by statute calls for \$2,316,680. This covers the force of supervisors and rangers who care for the national forests, as well as office employes. The general expenses require \$2,714,420. These expenses are enumerated as follows:

To enable the Secretary of Agriculture to experiment and to make and continue investigations and report on forestry, national forests, forest fires, and lumbering, but no part of this appropriation shall be used for any experiment or test made outside the jurisdiction of the United States; to advise the owners of woodlands as to the proper care of the same; to investigate and test American timber and timber trees and their uses, and methods for the preservative treatment of timber; to seek, through investigations and the planting of native and foreign species, suitable trees for the treeless regions; to erect necessary buildings: Provided, That the cost of any building erected shall not exceed six hun-

dred and fifty dollars; to pay all expenses necessary to protect, administer, and improve the national forests; to ascertain the natural conditions upon and utilize the national forests; and the Secretary of Agriculture may, in his discretion, permit timber and other forest products cut or removed from the national forests, except the Black Hills National Forest in South Dakota, to be exported from the state, territory, or the district of Alaska in which said forests are respectively situated: Provided, That the exportation of dead and insect-infested timber only from said Black Hills National Forest shall be allowed until such time as the forester shall certify that the ravages of the destructive insects in said forests are practically checked, but in no case after July first, nineteen hundred and twelve; to transport and care for fish and game supplied to stock the national forests or the waters therein; to employ agents, clerks, assistants, and other labor required in practical forestry and in the administration of national forests, in the city of Washington and elsewhere; to collate, di-

gest, report, and illustrate the results of experiments and investigations made by the Forest Service; to purchase law books to an amount not exceeding five hundred dollars, necessary supplies, apparatus, and office fixtures, and technical books and technical journals for officers of the Forest Service stationed outside of Washington; to pay freight, express, telephone, and telegraph charges; for electric light and power, fuel, gas, ice, washing towels, and official traveling and other necessary expenses, including traveling expenses for legal and fiscal officers while performing Forest Service work; and for rent in the city of Washington and elsewhere, as follows:

For salaries and field and station expenses, including the maintenance of nurseries, collecting seed, and planting, necessary for the use, maintenance, and protection of the national forests. (The specific allotment for each forest is then designated in the bill.)

For fighting forest fires and for other unforeseen emergencies, one hundred and fifty thousand dollars, of which sum seventy thousand dollars shall be immediately available.

For the purchase and maintenance of all necessary field, office, and laboratory supplies, instruments and equipment, one hundred and ninety-eight thousand and eighty dollars;

For investigations of methods for wood distillation and for the preservative treatment of timber, for timber testing and the testing of such woods as may require test to ascertain if they be suitable for making paper, and for other investigations and experiments to promote economy in the use of forest products, one hundred and seventy-seven thousand and forty dollars;

For experiments and investigations of range conditions within national forests, and of the methods for improving the range by reseedling, regulation of grazing, and other means, eighteen thousand four hundred and twenty dollars;

For silvicultural and other experiments and investigations within national forests necessary for tree planting, for the reproduction of existing forests, and the regulation of cutting, one hundred and sixty-six thousand six hundred and forty dollars;

For silvicultural, dendrological, and other experiments and investigations independently or in cooperation with other branches of the federal government, with states and with individuals, to determine the best methods for the conservative management of forests and forest lands, eighty-four thousand five hundred and twenty-eight dollars;

For market and other miscellaneous forest investigations, and for collating, digesting, recording, illustrating, and distributing the results of the experiments and investigations herein provided for, thirty-

three thousand seven hundred and sixty dollars;

Provided, That no part of the money herein appropriated shall be used to pay the transportation or traveling expenses of any forest officer or agent except he be traveling on business directly connected with the Forest Service and in furtherance of the works, aims, and objects specified and authorized in and by this appropriation: Provided further, That no part of this appropriation shall be paid or used for the purpose of paying for, in whole or in part, the preparation or publication of any newspaper or magazine article, but this shall not prevent the giving out to all persons without discrimination, including newspaper and magazine writers and publishers, of any facts or official information of value to the public: Provided further, That so much of an Act entitled "An act making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and eight," approved March fourth, nineteen hundred and seven (Thirty-fourth Statutes at Large, pages twelve hundred and fifty-six and twelve hundred and seventy), which provides for refunds by the Secretary of Agriculture to depositors of moneys to secure the purchase price of timber or the use of lands or resources of the national forests such sums as may be found to be in excess of the amounts found actually due the United States, be, and is hereby, amended hereafter to appropriate and to include so much as may be necessary to refund or pay over to the rightful claimants such sums as may be found by the Secretary of Agriculture to have been erroneously collected for the use of any lands, or for timber or other resources sold from lands located within, but not a part of, the national forests, or for alleged illegal acts done upon such lands, which acts are subsequently found to have been proper and legal; and the Secretary of Agriculture shall make annual report to Congress of the amounts refunded hereunder.

The law further designates the expenditure of \$500,000 for "improvement of national forests:"

For the construction and maintenance of roads, trails, bridges, fire lanes, telephone lines, cabins, fences, and other permanent improvements necessary for the proper and economical administration, protection, and development of the National Forests, not to exceed fifteen per centum of the total of all sums appropriated under "General Expenses, Forest Service," and under "Improvement of the National Forests," may be used in the discretion of the Secretary of Agriculture as provided above under "General Expenses, Forest Service," and under "Improvement of the National Forests," for all expenses necessary for the general administration of the Forest Service.

An examination of this appropriation

measure sustains a point made in an editorial in this magazine a few months ago, that the manner of expenditure of the funds entrusted to the Forest Service is quite closely determined by Congress itself and the charges in regard to the expenditures of the Service made by some senators and representatives for political effect therefore fall to the ground.

Boundary Changes

A recent presidential proclamation has eliminated 276,424 acres in California from the Inyo National Forest and added 80,532 acres, the greater part of which is located in California, with a small portion lying in Nevada. Most of the land eliminated lies along the Owens River Valley, where the question as to the proper boundary for the forest has been much discussed. The Owens River settlers have been urgent to

have the forest area reduced, but the representatives of the city of Los Angeles have regarded the retention of the land by the government as essential to the success of its great aqueduct project, intended to assure the municipality an abundant supply of pure water from the Sierras, 250 miles away. The elimination now made is the result of an agreement finally arrived at by representatives of the Owens River settlers, the Forest Service, and the city of Los Angeles whereby the conflict of views and interests was adjusted on a basis which commands the assent of all parties.

The president also signed a proclamation adding 141,123 acres to the Fishlake National Forest, Utah. The same proclamation eliminates 1,276 acres from the forest. Both changes in the forest boundary take place in the eastern division, in Sevier and Wayne counties. No change is made in the boundary of the western (Glenwood) division.

STATE WORK

California

Forestry and conservation measures have been subjects of contention in the California legislature but the senate on March 22d passed the assembly bill creating a California Conservation Commission and appropriating \$100,000 for its work in the next two years. The commission is to consist of five members, to be appointed by the governor, and to serve without compensation beyond having their actual expenses paid. The commission is to gather data and information concerning forestry, water and water-power, electricity, mines and mining, mineral and other lands, dredging, reclamation and irrigation, and is to advise the next legislature what laws should be passed.

Maine

Governor Plaisted on Monday, April 10, appointed Frank E. Mace to succeed Edgar E. Ring, as state forest commissioner and land agent. Mr. Ring had held the office for ten years.

Michigan

The *Grand Rapids Press* says: If Michigan is to have forest reserves the \$30,000 asked by the public domain commission to carry on the work should be granted. To provide a body with the powers accorded this and then to deny it the means to carry on its work is a policy which will

land the state nowhere. With the present attention being given to the development of western Michigan the need for the appropriation sought becomes apparent.

The bill, which has passed the senate and now is in the hands of the committee on ways and means in the house, provides for an immigration bureau and in addition authorizes the commission to inaugurate a vigorous conservative policy. The former feature alone means much to this section of the state. Settlers on the land now unoccupied would bring a wide and substantial prosperity to this district, endowed by nature with great possibilities and lacking only men and women to reap and distribute the benefit of its resources. If these practical aims are to be achieved and the 280,000 acres set aside as forest reserves are to be protected from fire and waste money must be provided. The \$9,500 under which the forestry commission, which preceded the present body, operated is inadequate for the big work which must be done. The reserves now are scattered in fifty-five counties, while the former appropriation was for the care of but two reserves or a total of about 45,000 acres.

The presence on the commission of Charles W. Garfield, of Grand Rapids, should be an assurance to the representatives from this district that concrete results are within reach for every dollar expended. Mr. Garfield's long experience in this particular field is a guarantee that the money will not be wasted.

The New Minnesota Law

After a somewhat protracted fight the Minnesota legislature has passed a comprehensive state forest law "to provide for the preservation of forests in this state and for reforestation and for the prevention and suppression of forest and prairie fires." The act repeals earlier laws inconsistent with it. It establishes a state forestry board, with a state forester, and a suitable appropriation, and it removes the inconsistency of a forestry board without power, and a forestry commissioner serving under the state auditor. The text of the act is given herewith, as it will be of great interest to students of state forestry legislation:

Section 1. There shall be a state forestry board, of nine members, composed of the director of the forestry school and the dean of the agricultural college of the University of Minnesota and seven others appointed by the governor, for a term of four years and until their successors qualify. Three of said members shall be appointed upon the recommendation of the regents of the university, and, of the other four, one shall be appointed upon the recommendation of each of the following bodies: The State Forestry Association, the State Agricultural Society, the State Horticultural Society, and the State Game and Fish Commission—provided suitable persons be recommended by them to the governor not later than January 31 of the year in which such terms expire. All vacancies shall be filled the same as the original appointments. The members now in office shall hold through the terms for which they were respectively appointed. So far as practicable, all such appointees shall be appointed with reference to their knowledge of and interest in the planting and cultivation of trees in prairie regions, the preservation of natural forests, the reforestation of denuded lands, and the protection of the sources of streams.

Sec. 2 The State Forestry Board shall appoint a secretary at a salary not to exceed eighteen hundred (1800) dollars per annum, whose duties shall be prescribed by the board.

Sec. 3. The board shall have the management of the forest reserves and of all other property acquired therefor, supervise all matters of forest protection and reforestation and have charge of all moneys appropriated therefor or accruing therefrom, including the forest reserve fund and the forest service fund. It shall ascertain and observe the best methods of reforestation cut-over and denuded lands, foresting waste and prairie lands, preventing destruction of forests and lands by fire, administering forests on forestry principles, encouraging private owners to preserve and grow timber for commercial purposes, and conserving the forests around the head

waters of streams and on the watersheds of the state, and shall collect information regarding the timber lands owned by the state. On or before the first Monday in December of each year the board shall report its doings, conclusions and recommendations, and any damage caused by forest and prairie fires and any trespassing upon the state lands to the governor, which report shall be printed and distributed to the members of the legislature and otherwise as the board may direct.

Sec. 4. The board shall elect a president and vice president annually. It may appoint an executive committee on which it may confer authority to act for it in minor details which cannot conveniently be acted upon by the board. The board shall appoint a state forester who shall be a trained forester, at a salary not to exceed four thousand (4,000) dollars per annum, and he shall be allowed necessary traveling and field expenses incurred in the conduct of his official duties. The office of the state forester shall be at the state capitol and the board is hereby authorized to employ such office assistants as may be necessary and to fix their compensation. The state forester, with the approval of the state forestry board, may appoint an assistant forester and such other employees, outside of the office assistants, as may be necessary in carrying out the provisions of this act and fix the amount of their compensation; and the state forester shall have the power to remove any of such subordinate officers and employees so appointed by him. He shall be authorized under the direction and approval of the state forestry board to purchase all necessary equipment, instruments and field supplies. A full and accurate account of all receipts and expenditures incurred in the carrying out of the provisions of this act, with such vouchers and forms as may be recommended by the state public examiner, shall be kept in a system of books prescribed by such examiner. The state forester shall execute all rules and regulations issued by the state forestry board pertaining to forestry and forest protection within the jurisdiction of the state; have charge of the work of protecting all forests and lands from fire; shall investigate the origin of all forest fires, and prosecute all violators of this act; shall prepare and print for public distribution an abstract of the forest fire laws of Minnesota, together with such rules and regulations as may be formulated by the state forestry board. He shall prepare printed notices calling attention to the dangers from forest fires and cause them to be posted in conspicuous places, and shall furnish same to the railroad companies whose duty it shall be to post them in such places as he may direct.

Sec. 5. The state forester shall become familiar with the location and area of all

state timber cut-over lands and prepare maps of forest reserves and each of the timbered counties showing the state lands therein, and shall supply such maps to the district rangers, to the officials of the state and counties requiring them, and in all ways that are practical and feasible shall protect such lands from fire and the illegal cutting of timber; he shall report from time to time to the board, such information as may be of benefit to the state in the care and management of its timber; it shall be his duty to inquire into the extent, kind, value and condition of all timber lands; the amount of acres and value of timber that is cut or burned, and he shall also report the quantity and species of second-growth timber, and shall not later than the first of December of each year make a written report to the state forestry board upon all such data ascertained by him, and shall recommend therein plans for improving the state system of forest protection, management, and reforestation.

Sec. 6. The state forester shall cooperate with the state auditor and with the several departments of the state and federal governments, or with counties, towns, corporations, and individuals, in the preparation of plans for forest protection, management, replacement of trees, wood lots, and timber tracts, using his influence as time will permit toward the establishment of scientific forestry principles in the management and promotion of the forest resources of the state.

Sec. 7. The state forester shall also cooperate with the state highway commission and with the supervising officers of the various towns and villages in the construction of fire-breaks along section lines and public highways.

Sec. 8. The state forester may advance, as he deems wise, education in forestry within the state by publications and lectures, and upon the invitation of the director of the college of forestry of the University of Minnesota may cooperate with the said college so far as his time will permit, and such college shall furnish such aid to him as in the circumstances is consistent with its own proper functions.

Sec. 9. It shall be the duty of the state forester to audit and inspect all bills for salary and expenses incurred by the district rangers and by fire patrolmen for the suppression, checking and control of fires and recommend to the forestry board the amounts justly due and which should be paid.

Sec. 10. As soon as practicable after this act shall take effect, the state forester may, with the approval of the state forestry board, create and establish patrol districts, including all lands of both state and private ownership, upon which there is a probability of forest and brush fires starting, and establish rangers over the said districts.

Sec. 11. Under the direction of the state forester, the district rangers are charged with preventing and extinguishing forest fires in their respective districts, and the performance of such other duties as may be required by the state forester.

They may arrest without warrant any person found violating any provisions of this chapter, take him before a magistrate and there make complaint. When the district rangers shall have information that such violation has been committed, they shall, without delay, make similar complaint, and have the same prosecuted. The district rangers shall not be liable for civil action for trespass committed in the discharge of their duties.

Sec. 12. At any time district rangers, with the approval of the state forester, may employ suitable persons to be known as fire patrolmen, permanently to remain upon and patrol such territory, state or private, as may be assigned to them as long as may be required to prevent and extinguish any fire. Each such patrolman so employed shall be supplied with the necessary equipment. The state forester and the district ranger may, and, if they are absent and fires are actually burning in the forest, the fire patrolmen may, summon any male person of the age of 18 years and upwards to assist in stopping the fire, and may incur any other necessary and reasonable expense for the same purpose, but shall promptly report the same to the district ranger.

Any person summoned by any official of the state who is physically able and refuses to assist shall be guilty of a misdemeanor and shall be punishable by a fine of not less than \$5.00 and not more than \$25.00.

Sec. 13. When in the judgment of the state forester there is danger of the setting and spreading of fires from locomotive engines, he shall order any railroad company to provide patrolmen to follow each train throughout such fire patrol district or districts as he deems necessary to prevent fires. When the state forester has given a railroad company notice to provide such patrol after trains, the said railroad company shall immediately comply with such instructions throughout the territory designated; and upon its failure so to do, the state forester may employ patrolmen with the necessary equipment to patrol the rights of way of said railroad, and the expense of the same shall be charged to the said railroad company and may be recovered in a civil action in the name of the state of Minnesota, and in addition thereto, the company shall be guilty of a misdemeanor.

It is also made the duty of any railroad company, acting independently of such state forester, to patrol its right of way after the passage of each train when necessary to prevent the spread of fires and to use the highest degree of diligence to prevent the setting and spread of fires, to

cause the extinguishment of fires set by locomotives or found existing upon their respective rights of way and for any violation hereof such railroad company, its officers and patrolmen shall be guilty of a misdemeanor, and be punished by a fine of not less than fifty (50) dollars, nor more than one hundred (100) dollars and costs, and in addition thereto such railroad company shall be liable for all damages caused or permitted by it.

Section 14. Every company operating a railroad for any purpose shall equip and use upon each locomotive engine a practical and efficient spark arresting device which the master mechanic shall cause to be examined, and the same shall be examined by the master mechanic or some employee each time before leaving the roundhouse, except when snow is on the ground, and the master mechanic, or employee making such examination, shall be held responsible for the good condition of the same, but without relieving the company from its responsibility hereunder.

Every such company shall keep its right of way clear of combustible materials, except ties and other materials necessary for the maintenance and operation of the road, from April 15th to December 1st.

No company shall permit any of its employees to leave a deposit of fire, live coals or ashes in the immediate vicinity of wood land or lands liable to be overrun by fire, and every engineer, conductor or trainman discovering a fire adjacent to the track shall report the same promptly to the agent at the first telegraph or telephone station reached by him, whose duty it shall be as representative of such company, to at once take necessary steps to put out such fire.

Every such company shall give its employees particular instructions for the prevention and extinguishment of fires, and shall cause warning placards furnished by the state forester, to be conspicuously posted at every station in the vicinity of forest, brush, and grass lands, and, when a fire occurs on the right of way of its road, shall immediately concentrate such help and adopt such measures as shall be available for its extinguishment.

Any company violating any provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be fined not less than fifty dollars and not exceeding one hundred dollars and costs of prosecution for each offense, and any railroad employee violating the same shall be guilty of a misdemeanor, and shall be punished by a fine of not less than twenty-five dollars nor more than one hundred dollars and costs of prosecution, or by imprisonment in the county jail not exceeding ninety days.

Sec. 15. Where and whenever in the judgment of the state forester there is or may be danger of starting and spreading of fires

from slashings and debris from the cutting of timber of any kind and for any purpose, the state forester will notify the individual, firm or corporation, for and by whom the said timber has been or is being cut, ordering them to dispose of the slashings and debris as he may direct. Where conditions do not permit the burning of the slashings and debris over the entire area so covered, the state forester may require the person, firm or corporation for and by whom the timber was cut, to dispose of such slashings and debris in such a way as to establish a safe fire line around the area requiring such protection, the said fire line to be of a width and of a character satisfactory to the state forester.

When any person, firm or corporation, shall have been notified by the state forester to dispose of slashings and debris, either by entirely consuming the same or establishing a fire line sufficient for the protection of adjoining property, and fails to comply with such instructions, the said person, firm or corporation shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be punished by a fine of not less than \$50.00 and not exceeding \$100.00 and costs of prosecution for each violation thereof or failure to comply therewith.

When any such branches, slashings or debris are left unburned contrary to the instructions of the state forester, the state forester may go upon the premises with such force of men as may be necessary, and burn such branches, slashings and debris, and the expense thereof shall be a lien upon the land on which they are situated, enforced as liens for the improvement of real estate are enforced, and such expense shall be a prima facie valid claim that may be collected from the person, firm or corporation who cut the timber or wood from which the said slashings and debris were made.

Sec. 16. Any person or corporation who cuts or fells trees or bushes of any kind in clearing land for roadbed or right of way for any railroad, highway or trail shall in the manner and at the time as above prescribed burn the slashings, and all combustible material except fuel and merchantable timber.

Any person or corporation who cuts or fells trees or bushes of any kind in clearing land for agricultural or pasturage purposes, or who in any way clears land, is prohibited from setting fire to the slashings, brush, roots or excavated stumps or other combustible material on such land and letting the fire run; the material must be disposed of pursuant to the regulations of the state forester.

Any person who shall violate any of the provisions of this section shall be deemed guilty of a misdemeanor, and on conviction thereof, be punished by a fine of not less than twenty-five dollars, nor more

than one hundred dollars, or by imprisonment in the county jail for not less than ten days nor more than ninety days.

Sec. 17. The wages and expenses of men summoned or employed to fight forest fires actually burning, shall be fixed and paid for by the state forester and the labor reckoned and paid for by the hours of labor performed, which shall not exceed the rate of 25 cents per hour employed; provided no pay shall be given for fighting fire within one mile of the residence of such person unless employed by the state forester or his assistants. The forestry board is authorized to draw out of the money appropriated by this act a reasonable sum, not to exceed five thousand (5,000) dollars at any one time, from the state treasurer and place the same in the hands of the state forester to be used by him in paying emergency expenses, and the state auditor is authorized to draw his warrant for such sum when duly approved by the president and secretary of said board. The state forester shall take proper sub-vouchers or receipts from all persons to whom such funds are paid and after the same have been approved by the state forestry board, they shall be filed with the state auditor.

Sec. 18. Every employe of the state forestry board and every person lawfully commanded to assist in enforcing any of the provisions of this chapter, who shall unjustifiably refuse or neglect to perform his duty; every person who shall kindle a fire on or near forest, brush, or prairie land and leave it unquenched, or be a party thereto, or who shall set fire to brush, stumps, dry grass, field, stubble, or other material and fail to extinguish the same before it has endangered the property of another; every person who shall negligently or carelessly set fire, or cause to be set on fire, any woods, prairie, or other combustible material, whether on his own land or not, by means whereof the property of another shall be endangered, or who shall negligently suffer any fire upon his own lands to extend beyond the limits thereof; every person who shall use other than incombustible wads for firearms, or carry a naked torch, firebrand, or exposed light in or near forest land, or who, in the vicinity of such land, shall throw or drop into combustible material any burning match, ashes of pipe, lighted cigar, or any other burning substance, and who fails to immediately extinguish the same, and every person who shall deface, destroy or remove any abstract or notice posted under this chapter shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than twenty-five dollars and not exceeding one hundred dollars and costs of prosecution or by imprisonment in the county jail not less than ten days and not exceeding ninety days.

Sec. 19. All villages and cities in the state situated in the timber area are hereby authorized, and all such municipalities where the same is possible so to do are hereby directed, to clear off all combustible material and debris and create at least two good and sufficient fire-breaks of not less than ten feet in width each, which shall completely encircle such municipalities at a distance of not less than twenty rods apart, between which backfires may be set or a stand made to fight forest fires in cases of emergency.

It is hereby made the duty of the district rangers to report to the state forester any failure to comply with the provisions of this section or any violation of this act and any failure so to do shall be punished by a fine of not less than twenty-five dollars, nor more than one hundred dollars.

Sec. 20. Every road overseer or assistant of a road overseer or other local officer having charge of the highway, who finds that any person has left a camp fire burning in his district, shall extinguish the same, and take prompt measures to prosecute the person or persons who so left such fire.

Sec. 21. Every person who, when the ground is not covered with snow, starts a fire for any purpose not hereinafter specified in this act, in the vicinity of forest or prairie land, shall exercise every reasonable precaution to prevent such fire from spreading, and shall before lighting the same clear the ground from all branches, brushwood, dry leaves and other combustible material within a radius of ten feet from the fire, and shall carefully extinguish the fire before quitting the place.

Sec. 22. Whoever under any circumstances sets fire must exercise care and precaution in proportion to the danger.

Whenever a fire set by any person or corporation spreads to and destroys property belonging to another, it shall be prima facie evidence that the party so setting such fire is guilty of negligence in setting the same and allowing it to spread.

Sec. 23. No appeal shall be allowed from a judgment in justice's court in any prosecution under this chapter unless the person appealing shall, within the legal time prescribed, enter into a recognizance with two sufficient sureties, surety company or cash bail, in twice the amount of the fine and costs, to be approved by the justice, conditioned to appear before the district court on the first day of the general term thereof next to be held in and for the same county, and abide the judgment of said court therein.

The justice may examine the proposed sureties under oath, and in such case shall make and keep a record of their answers in respect to the kinds and

amount of their property that is not exempt from execution, and furnish a copy of the same to the state forester.

Sec. 24. The supervisors, constables and clerks of towns, mayors of cities and presidents of village councils, are hereby constituted fire wardens for their respective districts, and it is hereby made their duty to do all things necessary to protect the property of such municipalities from fire and to extinguish the same.

All towns, villages and cities are hereby authorized and directed to take necessary precautions to prevent the starting and spreading of forest or prairie fires and to extinguish the same and are hereby further authorized to annually levy a tax of not more than five mills upon the taxable property of such municipalities, which, when collected, shall be known as the "Fire Fund" which may be used in paying all necessary and incidental expenses incurred in enforcing the provisions of this act.

In all townships constituted within any of the forest patrol districts which may be established by the state forestry board, the respective town and village officers shall cooperate as far as possible with and act under the general supervision and direction of the state forestry officers.

Sec. 25. All moneys received as penalties for violations of the provisions of this act, less the cost of collection and not otherwise provided for, shall be paid into the treasury of the county in which the penalties for said violation of the provisions of this act were imposed.

Sec. 26. There is hereby appropriated from the general revenue funds of the state out of any moneys not otherwise appropriated the sum of \$15,000 for the fiscal year ending July 31, 1911, \$75,000 for the fiscal year ending July 31, 1912, and \$75,000 for the fiscal year ending July 31, 1913, which shall be credited to the Forest Service to be used therefor as provided in this act. The manner of presenting claims to the state auditor and payment of the same shall, so far as practicable, be in accordance with Chapter Ninety-six (96) of the General Laws of Minnesota for 1905. Itemized vouchers of all expenses shall be approved as directed by the forestry board.

Sec. 27. Whenever the word "board" is mentioned or referred to in the forestry laws of the state of Minnesota it shall

mean the state forestry board herein created.

Sec. 28. Chapter 22, Revised Laws 1905 and Sections 2505, 2506, 2507, 2508, 2510 and 2515, Revised Laws, 1905; Chapters 82 and 310 of the General Laws of Minnesota for 1905; Chapter 182 of the General Laws of Minnesota for 1909 and all acts and parts of acts inconsistent with this act are hereby repealed.

The New Hampshire Timberland Association

The lumber companies of the North Country of New Hampshire, who organized an association last year to protect their timberlands from fire, and in co-operation with the forestry commission erected several lookout stations at their own expense, have formed a corporation under the general laws, to be known as the New Hampshire Timberland Association. The objects of the corporation are to preserve the forests from loss by fire, to enlist the aid of the United States and state governments in the work, and to encourage the enactment of such laws as will best serve these objects. The incorporators of the association are the Berlin Mills Company, E. Libby Sons Company, Connecticut Valley Lumber Company, International Paper Company, and the Odell Manufacturing Company.

Oregon

The new state forestry board is made up as follows: A. T. Buxton, of Forest Grove, recommended by the state grange; George H. Cecil, of the United States Forest Service, recommended by that department to Governor West; L. S. Hill, of Junction City, recommended by the Oregon and Washington Lumbermen's Association; A. P. Sprague, of Portland, recommended by the Oregon Forest Fire Association; Dan P. Smythe, of Pendleton, of the Oregon Wool Growers' Association; Governor West and George W. Peavy, of Corvallis, head of the department of forestry at the Oregon Agricultural College.

An Oregon journal predicts lively times in this board since Mr. Smythe, a wealthy sheep man, is an old-time foe of the United States Forest Service, which has a representative on the board.

EDUCATION

The Biltmore Forest School

The Biltmore Forest School with fifty students has returned to America after a successful winter session in Germany. The foresters-to-be arrived in New York on the 27th of March. In the German forests the results of German silviculture, forest management, forest finance, forest policy, and forest protection were seen and studied from beginning to end. In the manufacturing institutions there was observed a high quality of work as well as the small quantity of the output; also the economy practiced under the pressure of high stumpage prices. The students had impressed upon them that conservative forestry is practised wheresoever it pays to conserve the forests; that stumpage is being raised wherever the price of the tree pays for the cost of raising the tree; that unlimited competition is detrimental to forestry of a conservative type.

The field work for the month of March included two of the most interesting trips of the winter. In the Spessart Mountains, a district of Bavaria known as the home of the best white oak on earth, were seen oaks up to 400 years old that command a stumpage price of \$170 per thousand feet board measure, on an average. Individual trees—numbers of them—having a stumpage value exceeding \$500. The texture of the timber seems to be particularly fine. The owners (a number of family estates, the Bavarian government and the Prussian government) are in the habit of putting annually on the market a limited number of trees only, so as to maintain the price. This arrangement preserves the forests and a permanent supply of oak timber.

Five days vacation were taken after landing. Then the school went into the Adirondacks to study New York forestry. On the 21st they left for North Carolina, spending the 22d in Washington, acquainting themselves with the United States Forest Service.

Elementary School Forestry

Announcement has been made that courses in scientific gardening and practical forestry are to be added to the curriculum of the Newton (Mass.) Technical High School, under the direction of Irving

O. Palmer, one of the instructors. City Forester Charles Bucknam will assist and his force of men is now at work preparing the land. Near the tennis courts in the rear of the school building the gardens will be located, and all of the product will be used in the cooking classes and served to the gardeners. The nursery will be located at the southerly end of the school, between Walnut street and the athletic field. Arrangements will be made for planting six hundred native trees. The first consignment will consist of two hundred white ash trees. Pupils will be given instruction in planting, grafting, pruning and spraying methods and will be shown the growth of the trees by periods. A number of plants will also be set out and studied. The course would appear to be one in the growing and management of trees, rather than in "practical forestry," but it is a first step well adapted to the circumstances of a city high school.

Summer Cruise for Montana Forestry Students

A summer cruise for foresters and others is planned by the department of botany and forestry of the University of Montana. The course as contemplated would include visits to the best stands of western timber, viewing the operations of the Forest Service on the national forests, nurseries, and plantings, timber sales, protection against fire, grazing, reconnaissance, etc. It would also include visits to the largest milling and logging operations in different sections of the Northwest. Lectures on different phases of forestry will be given at appropriate points. The regions visited will include the northern Rocky Mountains, Puget Sound, the Columbia River, southern Oregon and the sugar pine country of California. It is expected that the party will leave Missoula, Mont., about July 1st, and that about six weeks will be given to the work. It is designed that the membership of the party should include, not only students of professional forestry, but also friends of conservation, practical lumbermen, and others who may wish to study western forestry and lumbering under advantageous conditions. For further information any one interested may address Professor J. E. Kirkwood, University of Montana, Missoula.

NEWS AND NOTES

State Control of Private Property

A decision of the Circuit Court of Appeals in the Oklahoma gas case seems to establish the status of a state's rights over the use of its natural resources:

A state may pass laws to regulate the management of private forests and of private property in land generally. (Opinion of the Supreme Court of Maine, March 10, 1908.)

A state as quasi sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water and the forests within its territory, irrespective of the assent of the private owner. (Supreme Court of the United States, April 6, 1908.)

But a state, when once it has permitted property in a natural resource (natural gas) to pass into private hands, cannot maintain its right to protect that resource by compelling the owner of it to refrain from engaging in interstate commerce, any provision of the state constitution to the contrary notwithstanding. (Circuit Court of Appeals, April 7, 1910.)

A Small Forest Reserve for Illinois

Simeon West, a wealthy resident of McLean County, Illinois, has given to the county a virgin timber tract of twenty acres. Should the county ever undertake to use this tract for any other purpose than a public park or forest the title will revert to the heirs of the donor. Mr. West hopes that his action will be an inspiration to others to do likewise.

Catalpa by Wholesale for Arbor Day

From the cities of Columbus, Kansas City, and Philadelphia come news of the enterprise of local merchants in furnishing the children trees for Arbor Day planting. In Columbus 50,000 little catalpas were so provided, in Kansas City, 100,000 of the same tree, and in Philadelphia, 400,000—also catalpas. It is not necessary nor would it be just to question the motive of these gifts to the public. If they were made for advertising purposes it is a kind of advertising that we may welcome. It may be open to question whether it is well to make all these contributions catalpas. For the middle west the hardy catalpa is one of the most serviceable of trees, but

for Philadelphia, it may be questioned whether it was the best tree that could be chosen. It is to be hoped that due care was exercised to obtain the right variety, for it would be a misfortune to have so many trees planted of the *bignonioides*, and those who investigated catalpa at all know how difficult it is to distinguish that very disappointing tree from *speciosa*. In Philadelphia fifty large trees (not catalpas) were given to eleven schools by the Pennsylvania Forestry Association.

The Delaware & Hudson Railroad's Forestry Work

At the nursery of the Delaware and Hudson Railroad Company at Bluff Point, Lake Champlain, the railroad is growing thousands of Norway spruce and other conifers for use in reforesting waste land in the Adirondacks and other places along the Saratoga and Champlain divisions. At Oneonta the company is growing red oak seedlings for the purpose of providing timber for ties. The company has decided to devote three acres to a nursery for the growing of red oak seedlings. The company plans to plant over 1,000,000 red oak trees, most of which will be furnished from this nursery. The industrial department of the Delaware and Hudson in collaboration with the superintendent of woodlands, Mr. Bristol, is preparing a booklet to be issued this spring in which the subject of planting trees is to be brought to the attention of farmers and others along the company's line. In addition to the distribution of the pamphlet the company will offer to farmers and small land owners the advice and instruction of Mr. Bristol free of charge.

New England Railroads Waking Up

It is announced that a railroad bureau for the industrial development of New England has been organized and will be opened at Boston May 1. It will be under the control of the New Haven, Boston and Maine and Maine Central railroad systems and will have the title of the New England Lines Industrial Bureau. Its head will be William H. Seely, now general freight and passenger agent of the Central New England Railroad.

The object is the promotion by the influence of the three railway systems of

every form of industrial development in New England, notably farming, fruit culture, dairy interests and every form of soil production, as well as factory industries and forestry and forest preservation. Later it is planned that the bureau develop various agencies throughout New England for the same industrial purposes. The expense of the enterprise will fall upon the three railroad corporations.

The plan has been under consideration for some years by the New Haven company and was expedited by signs of a farming revival in New England, as shown by the census returns and the larger values of New England farms, as well as their adaptation to new products, especially in the line of scientific fruit culture. It is time that the New England railroads learned something from the development work of southern and western roads. Hitherto they have done little to help their section.

The Adirondack Lumber Cut Decreasing

Statistics collected by Superintendent of State Forests Pettis of New York indicate that timber operations in the Adirondacks are decreasing owing to a lack of available timber. The amount of lumber cut in 1910 as reported to the state, is about 516,000,000 feet, board measure. This is a decrease of nearly 100,000,000 feet in the last year. The amount cut for pulp wood last year was considerably greater than that cut in 1909, but while the total amount of timber cut for all commercial purposes was more than a billion feet a year in 1908 and 1909 the total was considerably below the billion mark in 1910.

The Protection of Native Plants

The Society for the Protection of Native Plants has printed on cotton for outdoor use notices reading:

SPARE THE FLOWERS

Thoughtless people are destroying the flowers by pulling them up by the roots or by picking too many of them.

CUT what flowers you take, and leave plenty to go to seed.

These notices can be obtained from the secretary of the society, Miss M. E. Carter, Boston Society of Natural History, Boston, Mass. We should like to add to the above notice that too many wild flowers are picked without any special object. Many of our wild flowers that are beautiful in their own homes lose almost immediately their freshness and charm when picked. Why not leave them where they grow for others to enjoy? Some people when in the woods and fields have a mania for picking every flower they see, although often it is thrown away without even being carried home.

Pennsylvania's Thrifty Forest Policy

E. A. Ziegler, director of the Pennsylvania Forest Academy at Mont Alto, gave a lecture in the Lehigh University forestry course last month. Speaking of the work of the state he said: "The Pennsylvania state expenditures for forestry are proceeding on an economical and safe basis and a valuable state property is being created with a net income promised, beside the invaluable benefits of water, creation of raw materials for large industries and the building of homes in the forests themselves, and the financial advancement of the entire state." Mr. Ziegler described the method and work of the forest academy, which trains foresters for the state service, graduating ten each year, and discussed at length the cost of growing forests and probable returns.

Frank J. Phillips

The Forest Club Annual of the University of Nebraska, have an appreciate note by F. B. Moody on Professor Phillips:

"With deep regret the announcement is made of the sudden and untimely death of Frank J. Phillips, professor of forestry in the University of Nebraska. He died at his home in Lincoln, February thirteenth, nineteen hundred eleven. Professor Phillips was born in Grandville, Michigan, September twenty-fifth, eighteen hundred eighty-one. After graduating from the Grandville High School he worked his way through the Michigan Agricultural College, and completed the work in nineteen hundred three with the degree of bachelor of science. The same year he entered the branch of extension in the bureau of forestry studying forest conditions throughout the middle west until the fall of nineteen hundred four. His intense interest in forestry together with his great love for outdoor life caused him to take up that study in the University of Michigan. Forestry School where he received the degree of bachelor of arts in nineteen hundred five, and the degree of master of science in forestry in nineteen hundred six. After completing this course in the university he received an appointment as forest assistant in the Forest Service and spent a year in the southwest. In nineteen hundred seven he was appointed professor of forestry in the University of Nebraska, which position he held until his death. Prof. Phillips was a self-made man in every sense of the word. By hard knocks he had learned the practical side of forestry and his knowledge, coupled with keen powers of observation and a brilliant mind, served to make him a splendid leader and teacher, whose enthusiasm, cheerfulness and great appreciation of the efforts of others, will leave a lasting impression upon all who knew him."

“So great is the value of national forest area for recreation, and so certain is this value to increase with the growth of the country and the shrinkage of the wilderness, that even if the forest resources of wood and water were not to be required by the civilization of the future, many of the forests ought certainly to be preserved, in the interest of national health and well-being, for recreation use alone”

Treadwell Cleveland, Jr.



A NATIONAL CAPITAL FOREST

GREAT FALLS OF THE POTOMAC—A NEGLECTED
JEWEL OF WASHINGTON'S ENVIRONS

American Forestry

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A NATIONAL CAPITAL FOREST

By WILLIAM M. ELLICOTT

THE object of this paper is to recommend the creation of a national forest for demonstration and experiment and as a setting for the United States capital. Such a forest would be a fitting background, worthy of the dignity of the nation's seat of government and would give continuity and variety to the impression gained from the magnificence of buildings, boulevards and monuments of the city proper.

Some of the western states are happy in having areas set aside as national forests and national parks, and national forests are now to be established in the East, in the northern and southern Appalachian Mountains. We look also to Biltmore, in North Carolina, as a great achievement, and should view it as an object lesson in practical application of the principles of forestry to private lands. All these examples, however, are unfortunate in one respect—their remoteness from the main traveled routes, rendering them inaccessible to the vast majority of our people, for whom they exist but as shadows, exerting the minimum of influence in their daily life.

The necessities of the present time are such as to demand a full and thorough demonstration of the possibilities of the management of forests and their rehabilitation.

The experience of European nations illustrates, first, the dangers arising from denudation and, second, the commercial value of reforestation when it is done under scientific management.

The use of forests by the people becomes a habit which inures to the benefit of the whole population, adding to its vigor and zest of life.

Agricultural expansion in America has left certain areas unconquered because of their unfitness for cultivation, and in these rests the hope of future generations. One of these tracts, though sadly mutilated, has remained to our day a vast forest useful for no other purpose. Providentially also, it exists in a place which above all others should recommend it for protection and improvement to the people of the United States. It forms the background of the national capital, beginning at the bounding line of the District of Columbia at Bladensburg and extending northeast nearly twenty miles until it crosses the Patuxent River, a tract of 41,000 acres, while separated from it by a narrow strip between Washington and Laurel, there is another body of 16,000 acres. Beyond the Patuxent it swings eastward touching the Severn and South rivers and reaching the outskirts of Annapolis, the seat of the United States Naval Academy, and thereby adds another area of 43,000 acres.

Another forest district of vital importance to the nation's capital, containing some grand scenery which, though separated from the main bodies by the breadth of Montgomery county should be included in the purchase, borders the banks of the Potomac River from the District line to a point beyond the Great Falls, an area of 10,000 acres. Conditions here are distressing in the extreme, as no effort has so far been made to care for it, and year by year injury to the landscape is done. Surely devotion to the public welfare should prompt Congress to protect this great possession.

The value of the lands in question is comparatively small, but as the pressure of population increases this will not continue, and it is not wise to defer provision for its purchase. Altogether these areas cover one hundred and ten thousand acres. The Forest Service should ascertain the merits of the various districts for forest purposes and study the replanting of certain parts, and a commission should plan for the maximum of beauty and utility, which are lost for want of skillful and intelligent handling.

Water courses should be improved and artificial lakes could be made as beautiful as natural ones, and the attraction of the woods may be enhanced by the erection of suitable buildings properly located. A structure of the character of a German schloss or a small chateau to serve the traveling public as an inn or automobile club would not be out of keeping.

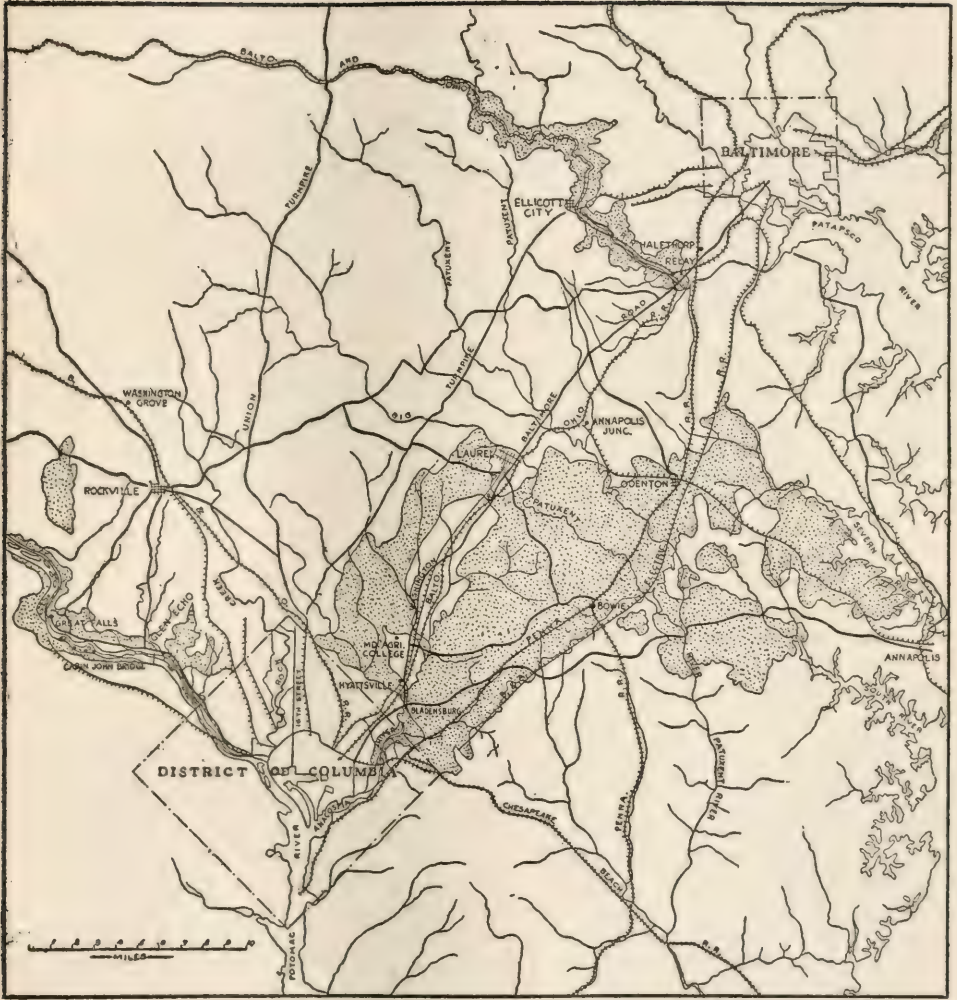
Here, then, at the gateway to the capital lies a splendid domain such as the kings of the earth from the earliest time have taken for themselves and jealously guarded as among their dearest possessions. We see it in the New Forest in England with its 90,000 acres—established by the Conqueror—in Fontainebleau also; and in that one which existed in the shadowy past within the present borders of the city of Paris, of which the Louvre retains the name of the king's hunting lodge of that day.

Many other forests might be mentioned, as, for instance, that proud possession of the city of Zürich, given to it by Charlemagne himself.

Looking, then, for a moment at the forest through the silver birches among the laurels, and into the hemlocks beyond—or turning about and gazing across the lake over the receding hills at sunset, you may, in spirit, visualize what you have seen with the eye of the flesh and thus discern what the people may do for themselves and why they should do it for their own well-being and for the benefit of generations to come.

At the southern apex of the territory indicated is the old town of Bladensburg and neighboring hamlets. Here are found historic specimens of colonial architecture—the Calvert mansion, the inn at which General Washington used to put up when he was planning the great city, and Parthenon Heights, a quaint old house of Revolutionary days. It is here that the two main branches of the Anacostia River meet, the one stream coming down from Tacoma Park, near the northern corner of the District of Columbia, and the other, or Northeastern Branch, emerging from the principal forest areas with which we have to do. The road leaving Bladensburg crosses the Anacostia bridge and arrives soon at the border of the forest and after traversing several miles of quite interesting country, the line of the Pennsylvania Railroad is reached. It then turns north and enters the forest again, passing through spruce, pine, oak, and poplar, all of which, under present ownership, is kept thinned out as it becomes of commercial value in the local market for timber, railroad ties, pulp or firewood.

Reference to the accompanying map which is made from detailed charts of the forest areas of the Maryland Forest Department will show that the District is approached by numerous electric and steam railways as well as by county and turnpike roads.



A NATIONAL CAPITAL FOREST LANDS MAP SHOWING IN THE DOTTED AREAS THE
PROPOSED NATIONAL FOREST

On approaching the height of land between the Anacostia and the Patuxent watersheds, there are hills of considerable height. Thence one descends rapidly to the Patuxent River valley, across which the forest still continues, reaching out towards the Patapsco, whose twenty miles of lovely nature extend from the harbor of Baltimore to Relay, thence to Ellicott City, six miles, and continues beyond between Baltimore and Howard counties, all of which is designated as a part of the parking system of Baltimore.

To render the forest available for use as a pleasure ground it must be opened to access. Intersecting alleys should be planned concentrating, perhaps, at some quiet pool or pretty refuge, and the roads which traverse it should be improved and the system extended to connect by way of the Potomac, the Anacostia and Rock Creek with the parking system of the District of Columbia, and with that future pantheon of American greatness, the "Mall," which will one day rival the most splendid examples of formal landscape design of the old world.

The undertaking of such a scheme will not only be the glory of our beautiful capital, but it will offer to a dense urban population and to countless transient visitors every form of sylvan pleasure which the inheritance of past ages can suggest from periods when the joy of life and pleasure in beauty went hand in hand.

For these reasons the purchase of a large tract of forest land at a cost of from two to three million dollars by the United States government is advocated. Had another site been chosen for the capital it is likely that the problem of its surroundings would have been entirely different, because the existing conditions are unique, and the suggestion of a forest background might have been chimerical and impractical.

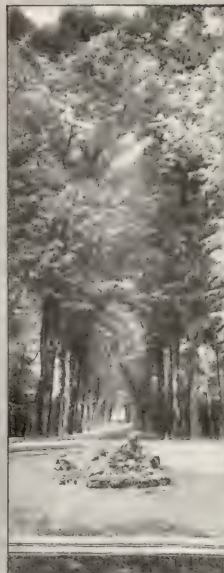
Fortunately, however, for the project, both as to its direct bearing upon the adornment of the capital and its value in assisting in the promotion of forest cultivation and protection whether private, state or national, all the circumstances illustrate the wisdom and even necessity of prompt provision for the need of the near future.

Its value for experimental and demonstration purposes can hardly be overestimated. The product of an average acre of such land planted in forest at a cost of eight dollars and cared for at an almost negligible annual expense, at the end of a period of forty years is about two hundred dollars, which represents a handsome profit from otherwise valueless property. Large tracts in private hands throughout the eastern states are available for this purpose only, and their almost universal neglect constitutes at once a great menace through their injurious influence upon climate and water supply and an immense financial loss, while to demonstrate the possibilities of this branch of agricultural industry and science should be a great advantage to the nation.

If the United States government desires to regard it simply as an object lesson it may look forward to a handsome revenue without contemplating such extensive cutting as to materially diminish its beauty and attraction.

Nearly all the great forests of Europe pay large profits, and the example of some of our great railroads in reforesting tracts to produce railway ties, telegraph poles and other timber, shows that the time has come when the original forests must be replaced by artificial means. The plan here outlined has been widely approved by societies interested in the public welfare and by the press. For the sake of brevity an editorial of the New York Evening Post, which appeared also in the Nation, is quoted as follows:

"Probably the first impulse of nine persons out of ten, on reading the proposal that the government shall create a national forest of 100,000 acres immediately adjacent to Washington city, will be to say that it is nonsense.



Courtesy of Art and Progress

GLIMPSE OF THE PARK AT VERSAILLES



Courtesy of Art and Progress

A NATIONAL CAPITAL FOREST

CONVERGING ALLEYS IN A FRENCH PLEASURE FOREST



Courtesy of Art and Progress

IN THE FAMOUS FIFTY-MILE AVENUE OF
NIKKO, JAPAN



Courtesy of Art and Progress

A NATIONAL CAPITAL FOREST

IN WOODWARD GROVE, A PART OF THE
FOREST PARK OF MADISON, WISCONSIN



MIXED HARDWOOD FOREST,
PRINCE GEORGES COUNTY,
MARYLAND



A NATIONAL CAPITAL FOREST



COUNTY ROADS IN THE PROPOSED
WASHINGTON NATIONAL FOREST AREA

But it is anything but nonsense. * * * That there is a considerable forest area in a primitive state in the region bordering on Washington must strike every one at all acquainted with that section. * * * If the tract is all Mr. Ellicott thinks it is, there is probably no investment of a few million dollars that would be better worth while. To preserve in perpetuity a genuine national forest 150 square miles in extent, within a stone's throw of the national capital, would be an invaluable achievement."

A REPORT ON THE WASHINGTON FOREST

BY F. W. BESLEY

STATE FORESTER OF MARYLAND

(A report from surveys, maps and data in the Maryland Forestry Department.)

THE area proposed for a national forest represents some of the oldest settled lands of the country. Since its occupation 250 years ago many changes have taken place. A considerable portion of the land under cultivation prior to the Civil War has since grown up in forest, not alone because of the scarcity of labor necessary for its continued cultivation, but because much of it was found better suited to the growing of timber than for agricultural crops. These young forests of hardwood and pine coming as a second growth have attained considerable importance, and by proper management they can be moulded into forests of great value. There are still to be found in small tracts some of the virgin forests showing the magnificence of the original growth and further illustrating future forest possibilities. For the botanist and the dendrologist, this is one of the most interesting regions of the eastern United States. Here on the border of two great physiographical divisions, the Coastal Plain and the Piedmont Plateau, the flora of the North mixes with that of the South, and gives a variety of species difficult to find in any other area of equal size. As a natural arboretum, this region is unsurpassed. There are over sixty-five tree species alone, to say nothing of a large number of arborescent shrubs. Most of the valuable commercial species of the entire eastern United States are represented here. The great diversity of soils and forest types offers exceptional advantages as a demonstration field for applied forestry.

A forest survey of the Maryland counties, partly included in the proposed national forest, was made by the writer in 1907-1910 and furnishes the forest data upon which this report and the accompanying map is based. In establishing a national forest, such as is proposed, it is very desirable to include, as far as possible, lands that are now largely wooded. The large wooded areas, lying between Washington, Baltimore and Annapolis, afford a rare opportunity for carrying out such a plan. The area shown on the map, lying between Washington and the Patuxent River, to the west of the Baltimore and Ohio Railroad, covers approximately 16,000 acres, of which about 8,300 acres, or 50 per cent, is now wooded. For the purpose of the forest description, any given area is considered wooded where there is a tree growth on the land at least ten feet high and where the trees are close enough together to form a stand. The main body of forest lying east of the Baltimore

and Ohio Railroad, including spurs extending along South River and the Severn River, covers approximately 84,000 acres, of which 50,200 acres, or 60 per cent, is wooded. The portion south of the Patuxent River is more largely wooded than the rest, amounting to 70 per cent. The portion to the northeast is 50 per cent wooded. The forests differ in character and composition, dependent upon soil conditions, especially as to moisture content, and also dependent upon the extent of previous cutting. On the few high gravel ridges along the edge of the Piedmont Plateau, the characteristic species are rock, post and black oaks. The higher slopes generally throughout the area are covered with scarlet and Spanish oaks, and chestnut; while on the lower slopes are found hickory, white oak and yellow poplar, walnut and black gum as the predominating trees. Along the streams a great variety of species are found, notably the maple, sycamore, beech, ash, birch, elm, etc. The characteristic trees of the swamps are red gum, willow, pin oak and willow oak.

The forests of the region have been cut over rather closely so that they consist principally of young growth, with scattering trees of larger size. Since it is easier to develop a young forest into good form than it is to improve an old one, the present situation has decided advantages. Furthermore, a forest largely composed of young growth can be purchased at a much more reasonable price than one containing timber of merchantable size. The probable cost of these lands can only be approximated. The average for the woodlands, exclusive of timber, would probably not exceed \$20 per acre. The value of merchantable timber based on the average stand for the entire area is approximately \$6 per acre, giving an average of \$26 per acre for the land and timber. Some of the land can be purchased for much less than this, while some, if included, will cost more, depending upon location and the value of the timber thereon.

The proposed extension of the national forest along the Potomac River, above Washington, includes a section noted for its natural beauty. The steep hills on the Virginia side of the river are well wooded, almost all the way from the District line above the Great Falls. On the Maryland side of the river the slope is less abrupt and there is more cleared land. The area indicated on the map, including a large tract west of Rockville, which is very largely wooded, is approximately 10,000 acres, of which about 6,000 acres, or 60 per cent, is now wooded.

The combined areas available for forest reservation as indicated on the map comprise about 110,000 acres, of which practically 64,500 acres, or 58 per cent, is now wooded. By making the boundaries more irregular, or excluding tracts that are nearly all cleared land, the area might be reduced and the percentage of woodlands correspondingly increased. The presence of cleared lands within the forest boundaries would not be a disadvantage. The best of the farm land could be used as experimental farms in cooperation with the Department of Agriculture, while those less adapted for agriculture could be planted in forests. It is safe to say that 85,000 acres of the tracts mentioned are typical forest lands already in forest or suitable for reforestation. There are many foreign trees that have not been fully tried in this country under forest conditions. The rate of growth of most of our native species under the most favorable conditions as would result in planting have not been determined. The field for forest experimentation is a large and promising one which would find here the ideal conditions for its fulfillment.



Photo from U. S. Forest Service

ZURICH'S FOREST ESTABLISHMENT IN
THE SIHLWALD



Photo from U. S. Forest Service

NATURAL REPRODUCTION AFTER THINNING
IN THE SIHLWALD OF ZURICH



Photo from U. S. Forest Service

A NATIONAL CAPITAL FOREST

TOURIST PATH IN TOWN FOREST, ADLISWIL,
ZURICH

HANDLING THE FIRE PERIL

By E. T. ALLEN

FORESTER, WESTERN CONSERVATION AND FORESTRY ASSOCIATION

IN 1910, probably the worst fire year in American history—a year when no rain fell for months, when the winds were veritable hurricanes, when fires sprang up everywhere and were numbered not by hundreds but by thousands—the Western Forestry and Conservation Association and its constituent membership carried safely through the season fully 16,000,000 acres of forest, containing at least the stupendous amount of 300,000,000,000 feet of timber. They spent \$700,000 for patrol and fire fighting and extinguished over 5,580 fires. Of the vast area protected, barely half a million acres were burned over, including timber, second-growth and cut-over land. Not more than half of one per cent of all the private timber in Idaho, Washington and Oregon, the states which suffered heaviest from the 1910 fires, was damaged, and the actual loss will not exceed a quarter of one per cent.

True, this loss was serious, and there was destruction of villages and human lives, but this was only the greater evidence of the test to which the associations were subjected. It proves only too well the hazard which applied equally to the immense area saved and compared to which the loss was insignificant. Had it not been for the associations, the West would have suffered one of the greatest calamities the world has seen.

During the legislative season following, the Association made an active campaign for more adequate state protective work, especially in Oregon and Washington, and due chiefly to its efforts these states passed completely new forest codes and increased their annual appropriation from \$23,000 to \$68,000.

The Association receives continual requests for information about organization and methods of cooperative work from all parts of the United States and Canada, and many new associations have resulted. It is mentioned more frequently in press and periodicals than any forest protective agency in the United States except the federal forest service.

All this means a record of achievement. It means that the timber owners of the Pacific Northwest are held up as protectors of the nation's resources instead of destroyers, as worthy of public commendation rather than suspicion. It means conceding an honestly earned right to a voice in laws and policy of conservation. It means that the stability of investments in western timber is being impressed on capital. Consequently it must mean sound principles, effective methods, and expenditures both liberal and well directed. What are, then, the objects and methods of the cooperative work which has given the Pacific Northwest this distinction?

The first principle of the movement is to preserve the forests. Not to tell some one else how, but to do it. There is a difference. Propaganda associations, like newspaper articles and speeches, are good in their way, but it takes real money and work to put out fires. The Pacific coast associations get the money and spend it. If two cents an acre suffices, well and good; if it takes

fifteen cents, why fifteen is spent. Probably this is the single greatest difference from the popular two-or-three-dollar-annual-due association and from the watch-dogged congressional system of guarding the public domain.

The second cardinal principle is community of interest. The associations do only those things by which the private forest owner, the people, the state and the government unquestionably benefit equally. Consequently they have no criticism or suspicion to fear and, what is far more important, are always in position to enlist support or join forces anywhere without embarrassing themselves or any one else. During all the recent controversies between factions regarding federal conservation policies, states rights and the like, the association meetings and affairs have been participated in with the utmost harmony and on equal footing by lumbermen, state officials, forest service officers and conservation enthusiasts. Whatever each may think of existing conditions or proposed changes in them, his work with the association is to make the very best of them as they are, with his own hands or money, for the common public good. Without denying that the question of for whom our resources are to be conserved is important, the association concerns itself not at all with this question, but proceeds to conserve, actually and practically, dealing with the resources themselves instead of views concerning them, to the end that they may not be destroyed before disputants agree as to who shall eventually enjoy them.

Related closely to community interest is the cooperative principle which has been applied, not only in theory, but to its utmost lengths in finance, counsel and objects. In the actual fighting of fires and publication of educational material, as well as in interchange of experience and suggestions, the forest owners work with each other, with the public and with state and government. Every effort is made to perfect a system under which all agencies for forest preservation may work not only without friction and with the strength of numbers, but with the least unnecessary expense of duplicated effort. Cooperation is a word often employed but seldom really applied. With us it means more than mere voluntary give or take, where each secures the other's help with the least return and both are mutually suspicious and guarded. We pool the work so each *has* to contribute his very best effort, or suffer himself in consequence.

Finally, publicity has been sought and welcomed, and in two ways. There has been an unremitting educational campaign to convert public and lumberman alike to necessity and methods of forest preservation. Furthermore, the actual work of the associations has been laid bare for scrutiny in every detail. Meetings and reports are public. There can be no charge that the influence of the organization is used for any hidden or improper purpose.

So much for general principles, now as to definite objects. It is the belief of the several forest owners' associations of the Pacific Northwest, affiliated in the Western Forestry and Conservation Association, that, while conservative management in all ways should be adopted as fast as conditions permit, the underlying foundation is safety from fire. They believe that to secure it there must be extensive education, strict enforcement of good fire laws, vigilant trained patrol to suppress before they spread the fires which start in spite of all preventive effort, and means of marshaling quickly an efficient force to fight the very few large fires which will occur, notwithstanding the foregoing precautions, just as a Baltimore or San Francisco burns.

They attempt to provide as much of such a system as private effort can provide, and to secure provision of the rest by the public. They believe that division of responsibility should be something like this: The forest owner should do his full share financially and is best equipped through local and

practical knowledge to patrol and fight fire. The state should assist him, for life, property and forests are community resources, and it is in the strongest position to do educational and law-enforcing work. But since to bring about such an ideal division in itself requires much education, the associations now have to assume much of this burden also.

These policies, and the methods by which they are put into practical application have developed from comparatively small beginnings. The first step was installation of patrol systems by individual owners. This led to cooperative patrols to reduce the expense of duplication. This, again, quickly proved the far greater efficiency of systematic organization, wholly aside from the question of cost, and also greater influence over careless public and lumbermen. Varying in extent of territory from a single watershed, as in Idaho, to half a state, as in Washington, patrols were consolidated into formal associations which assess each member at an equal acreage rate and transact the entire business of employing, supervising and supplying the fire forces, having them authorized by the state, building trails and telephone lines, etc. The cost is modified to suit the season by adding or laying off men, and danger points are given special attention, much better than through individual effort. Especially advantageous is the covering of gaps between holdings.

Cooperation with state and government forces is placed on a systematic basis. The territory of each association is divided into districts, each having its local patrol, and these are grouped by districts under inspectors. A chief fire warden controls the whole system. Every officer, in addition to straight patrol and fire work, is held responsible for keeping settlers, campers and loggers advised of the fire laws, dealing with violators, looking after dangerous slashings, etc. They are as severe upon lumbermen as upon any one else and pay no attention to ownership. The same work is done upon land belonging to non-members as upon that of members. This principle of equal treatment is a cardinal one throughout. The member owning but 40 acres has the same vote in the affairs of the association as the member with 100,000 acres.

The cost of this protection varies from 1½ cents an acre annually to as high as 15 cents expended last year by some of the hardest-hit Idaho associations. In Idaho, the state is a member of the associations, paying its pro rata on its timbered grant lands. In Washington it helps defray the expenses under agreement by the state forester.

One of the early lessons learned was that results in forest protection are most truly measured not by the fires put out, but by the absence of fires to extinguish. Patrolmen are selected largely for their ability to command public respect and enlist public interest in the first problem. Similarly each association gives its work and results the greatest possible publicity, which is an easy matter, for press and public accept the work as for community good and the information obtained as reliable.

It soon became apparent that the same advantage secured by local cooperation would apply to the working together in other than local matters by the several associations. Consequently the Western Forestry and Conservation Association was formed to afford central facilities for all forest protective agencies in the five states of Montana, Idaho, Washington, Oregon and California. It is a sort of grand lodge, without individual membership except that the chief state and federal forest officers are prominent and valued members. All associations devoted to forest conservation are eligible, including the public conservation associations having no connection with the timber industry, and have equal vote.

A forester is employed, with facilities for investigative and educational work. One of the chief duties of his office is to act as a clearing house for all

the affiliated organizations, not only for exchanging experience and suggestions, but also for issuing publicity matter, dealing with outside agencies and generally representing the movement in all ways. Being recognized as a disinterested authority, the central association is invited into council on subjects of forest protection and legislation all over the United States, by public, private and official agencies of all kinds. It furnishes material for the reports of state conservation and forestry commissions, prepares and advises upon forest legislation, supplies copy for educational literature and fire warnings, assists public speakers in the preparation of papers dealing with forestry subjects, and is frequently called upon to address conventions of all kinds.

One particularly important function of the central association is to collect and distribute frequent and reliable information concerning fire conditions, steps to meet them evolved by the several agencies, and the results in protection and losses. It affords the only means of combining state, federal and private reports. Two meetings a year are held, at which representatives of each of these agencies from the five states confer and to which are invited any others who may be concerned. For example, last December's meeting was made the occasion to discuss cooperation with officials of the transcontinental railroads.

All of this costs money. To insure against any possible charge of selfish influence by those who supply it, no individual contributions or dues are permitted. Once a year the affiliated organizations vote a pro rata assessment to cover the following year's estimated expenses, and in its use the forester is governed only by a semi-annual meeting of five trustees, one from each state, elected at an annual meeting in which every local association has equal voice regardless of the amount of its contributory assessment.

The history and future of this movement are of much significance. The five states involved contain half the standing timber in the United States today. The protection of this national resource is of the highest importance. But quite as important is the fact that here, where such forests can be produced more rapidly than elsewhere, is the great field of future American forestry—the nation's woodlot, as it were. And so far from requiring compulsion in the public's behalf, the private owners who hold these great forest areas in trust are doing their part to safeguard the future consumer more liberally than state or Congress, and by doing so today give the best earnest of their part in the future.





SPRUCE TIMBER KILLED BY THE SOUTH-
ERN PINE BEETLE IN THE MOUNTAINS
OF NORTH CAROLINA



Photo by A. D. Hopkins

INSECT CONTROL DEMONSTRATION CAMP



Photo by A. D. Hopkins

TREES KILLED BY BARK BEETLES

INSECTS INJURIOUS TO FORESTS

INSECTS INJURIOUS TO FOREST TREES

THE true relation of forest insects to forest conservation has not generally been fully recognized, yet the annual loss of standing timber that is killed or reduced in value by injurious insects is estimated by the Bureau of Entomology of the United States Department of Agriculture, through its expert in charge of forest insect investigations, Dr. A. D. Hopkins, at \$62,500,000. If this estimate is approximately correct it will at once be seen that insect control assumes an importance beside fire control in any scheme of forest conservation.

Fortunately, while this danger to our forest trees has been given so little popular attention, no subject relating to our forests has received more thorough and exact scientific investigation. The Bureau of Entomology, starting ten years ago with very little knowledge of the conditions, has accumulated in that period a notably full and exact knowledge of the life-history and habits of the principal species of insects that are destructive to our forest trees, and not only that but also, based upon it, a clear conception of means and methods of control, so that Dr. Hopkins does not hesitate to say with absolute certainty that these species can be controlled so as to be comparatively harmless. This conclusion is based not upon laboratory work and theory, but upon results actually accomplished on so large a scale as to afford positive proof of the fact. The results of the Bureau's work in this field have been made accessible in a series of circulars of the Bureau of Entomology, prepared by Dr. Hopkins,* and in the bulletins from which they are derived.

In this connection it is worth while to note that an important work is now being done in the Northwest through cooperation of the United States Forest Service, the states, and private owners, under the direction of United States Bureau of Entomology experts. This is on the largest scale yet undertaken. It is the beginning of a system of field stations to be established by the Bureau of Entomology in every forest district. By means of these stations the expert knowledge of the bureau can be made available and forest rangers, state forest officers, and the foresters and cruisers of private owners can be trained to put into practice the principles of scientific insect control. For it must always be remembered that successful control must be based upon complete knowledge of the insects and must be rightly directed. It would not be wise for laymen to undertake this work even after a study of the publications summarized in this article, without expert direction. And here is where the value of the Bureau of Entomology comes in, for it places at the command of land owners, at insignificant cost, expert scientific knowledge of the highest type.

INSECTS WHICH KILL FOREST TREES

Of all classes of insects which attack our forest trees and their products, the bark beetles of the species *Dendroctonus* are the most serious menace to our forests, and fortunately are among the best known and understood. It is

*Circular No. 125. Insects Which Kill Forest Trees.

Circular No. 126. Insects Injurious to the Wood of Living Trees.

Circular No. 127. Insect Injuries to the Wood of Dying and Dead Trees.

Circular No. 128. Insect Injuries to Forest Products.

Circular No. 129. Insects in their Relation to the Reduction of Future Supplies of Timber, and General Principles of Control.

These circulars are all revised extracts from Bulletin No. 58, Part V., Bureau of Entomology, United States Department of Agriculture.

with this species that the first of these circulars deals. The principal species in extent of their depredations are the southern pine beetle, eastern spruce beetle, Engelmann spruce beetle, Black Hills beetle, mountain pine and western pine beetles, Douglas fir beetle, and hickory bark beetle.

The southern pine beetle is one of the most dangerous insect enemies of southern pines. The eastern spruce beetles ravaged the spruce forests of New York, New England and southeastern Canada prior to 1900. The Engelmann spruce beetle, with habits similar to the last named species, has frequently done serious damage in Engelmann spruce forests in the Rocky Mountain region. The Black Hills beetle is one of the most destructive of the forest beetles, and during ten years is estimated to have destroyed more than a million feet of timber in the Black Hills National Forest. It is distributed throughout the middle and southern Rocky Mountain regions. The mountain pine and western pine beetles attack the sugar, silver, western, yellow and lodgepole pines of the region north of Colorado and Utah, westward to the Cascades, and southward through the Sierra Nevadas. The Douglas fir beetle occurs wherever that tree does. The hickory bark beetle has caused heavy loss in the last ten years from Wisconsin to Vermont and southward to central Georgia.

The bark beetles which kill trees attack the bark on the trunk and destroy the life of the tree by extending their burrows, or galleries, in all directions through the inner, living bark. The broods of young grubs or larvæ develop within the inner bark on which they feed. Those of some species develop to the adult stage within the inner bark and are exposed when the bark is removed, while those of other species transform to the adult in the outer corky bark, and the larvæ are not exposed when the bark is removed. Some species have two or more generations in a season, or annually, while others have but one; and in a few species it requires two years for a single generation to develop. From this knowledge of life-history and habits of beetles of this class are derived general directions for their control, which are embodied in the following rules: (a) Give prompt attention to the first evidence of a destructive outbreak as indicated by an abnormal percentage of yellow or red topped dying trees and especially when such trees occur in groups of ten or more, or cover large areas; (b) secure authentic determination of the particular species of insect responsible for the trouble; and (c) take prompt action towards its control according to specific expert advice. Some of the methods to be adopted to meet the requirements of local conditions are as follows:

- (1) Utilize the infested timber and burn the slabs during periods in which the broods of destructive beetles are in immature stages, or before the developed broods emerge from the bark.

- (2) Fell the infested trees and remove bark from the main trunk and burn the bark, if necessary.

- (3) Remove the infested bark from the standing timber and burn the bark when necessary.

- (4) Immerse the unbarked logs in ponds, lakes or streams where the bark will remained soaked long enough to kill the insects.

- (5) Remove the unbarked logs or products to a locality where there are no trees liable to attack within a radius of twenty miles or more.

The circular further suggests an insect control policy by which groups of dying trees can receive as prompt attention as that required for the prevention or control of forest fires. In state and national forests those in charge should have equipment and instructions for locating beetle-infested trees and for taking necessary action. In private forests the owners should be led to under-

stand that their personal interest demands that proper action be taken in cooperation with other interests, according to reliable advice.

These general suggestions are based upon actual demonstrations of successful control, some of which may be cited by way of illustration. An alarming outbreak of the eastern spruce beetle in northeastern Maine in 1900 and 1901 was controlled by the concentration of regular logging operations in the areas of infested timber, placing the logs in lakes and streams and driving them to the mills on the Androscoggin River. Thus, with little or no additional expense there was a saving to one firm, according to its estimate, of more than one hundred thousand dollars.

Complete control of the hickory bark beetle, threatening the destruction of hickory trees on Belle Isle Park at Detroit, Michigan, in 1903, was effected by felling and removing the infested trees, converting them into merchantable products, all without cost to the park commission.

An extensive outbreak of the Black Hills beetle in the vicinity of Colorado Springs in 1905 and 1906 was brought under control through the efforts of the private owners and of forest officials in the adjoining national forest. It was accomplished by cutting and barking about one thousand beetle-infested and beetle-killed pine trees. The cost of the operation was largely, if not entirely, covered by the utilized felled timber, although there was considerable unnecessary expense involved through the felling and barking of trees from which the beetles had emerged and from the unnecessary burning of the bark and crop.

Another striking example of what is possible in the way of controlling this most destructive enemy of the pine timber of the central Rocky Mountain region, was shown on a large private estate and the adjoining Pike National Forest in Colorado. In the spring of 1907 a ranger of the Forest Service, under instructions from the Bureau of Entomology, examined the timber on this estate and found that the Black Hills beetle had been making depredations for the past ten years or more, resulting in the death of the choicest timber to the extent of more than 800,000 board feet. At the time of examination about 65,000 board feet was infested. The owner was notified of the conditions by the Bureau of Entomology, but no action was taken. Another examination in the autumn of the same year showed that the infestation had increased fourfold. This led to the prompt adoption of the recommendations and by May of the following spring, 1908, a small number of trees on the national forest was cut and barked to kill the insects in the inner bark and one thousand trees on the private estate were felled, the logs converted into lumber and the slabs burned, which accomplished the desired purpose of destroying the broods of beetle. The owner realized a sufficient revenue from the timber to cover the expense and leave a net profit of over \$1,200. Examination of the area in the fall of 1908 showed that this effort to control the beetle was a complete success. Thus the average death rate of about 100,000 feet of timber annually for ten years or more was reduced to a minimum at a net profit on the cost.

In 1909 a threatening outbreak of mountain pine beetles in the Snowy Mountains of Montana adjacent to and within the Jefferson National Forest, involved more than 1,500 infested and dying trees. Thirteen hundred and fifty-five trees were cut and barked to kill the broods of beetles. Four hundred and twenty-two trees were cut at private expense, and seven hundred and eighty-three at the expense of the Forest Service and the remainder by local owners. The average cost for felling and removing the bark from the infected portion of the trunk was thirty cents per tree. Careful examination in December, 1909, of the area showed that while some fifty-six trees had been

attacked by the mountain pine beetle the broods were being destroyed by woodpeckers and other natural enemies, and that therefore the effort to control the beetle depredations were a success. In 1910 no timber died.

These examples have shown that outbreaks of beetles in the forests can be controlled at moderate expense and that it is perfectly practicable for the best methods to be applied by private owners.

INSECT INJURIES TO THE WOOD OF LIVING TREES

A certain class of insects attack the wood and bark of living timber and and while they do not contribute materially to the death of trees, or give much external evidence of their presence, they produce wounds in the bark and worm-hole and pin-hole defects in the wood which result in a considerable depreciation of commercial value. These defects are not detected until the trees have been felled and the logs converted into lumber. Thus the expense of handling and manufacture is added to the loss from defective material. Among insects of this class is the oak timber worm, which enters the wood of the trunks of the living trees through wounds in the bark and at the base of broken or dead branches and extends its burrows in all directions through the solid hard wood.

Another is the chestnut timber worm, which damages the chestnut in the same manner throughout its range. It is estimated that the reduction in value of the average lumber product at any given time is not far from thirty per cent. This insect also attacks oaks, and especially the red oak.

Carpenter worms are another enemy of the oak, making holes through the hard wood of the best part of the trunk, sometimes one and five-tenths inches in diameter by seventy-five hundredths of an inch. Other insects of this class noted by Dr. Hopkins are the ambrosia beetles, to which is due one of the commonest defects in white oak, rock oak, beech, whitewood or yellow poplar, elm, etc., known to the lumber trade as "grease spots," "patch worm" and "black holes"; the locust borer, turpentine beetles and turpentine borers, which are the cause of what is known as basal wounds, or basal fire wounds, in various species of pine: the white pine weevil, which is responsible for the abnormal development of white pine trees as a result of successive attacks on the terminals of saplings and young trees. This list is not complete, but includes some of the most serious enemies of the living forest trees.

Insects of this class, which cause defects in the wood of living timber, can best be controlled by (1) The utilization of all defective and infested timber that will pay expenses for manufacture into merchantable products: (2) the burning of infested timber and waste material not available for use, including dead and fallen timber to remove the breeding of insects like the oak timber worm and the chestnut timber worm, which go from the dead to the living timber; (3) the prevention of wounds of any kind in the bark of living trees; (4) the prevention of future losses by the practice of improved forestry methods to eliminate conditions favorable for injuries and contribute to a perpetual supply of vigorous, healthy timber to be utilized before it passes the stage of profitable increment.

INSECT INJURIES TO THE WOOD OF DYING AND DEAD TREES

Among insects, which by extending their burrows through sound sapwood and heartwood in dying and dead trees contribute to the deterioration and decay of a commodity which otherwise would be available commercially during periods of from one to twenty years or more after the death of the trees, are the sawyers, ambrosia beetles and pin-hole borers in cypress, all of which do extensive injury to the wood of coniferous trees; and the round-headed borers, timber worms and ambrosia beetles which similarly injure hardwood trees.



Photo by A. D. Hopkins
 INSIDE OF BARK WORKED BY SOUTHERN
 PINE BEETLE



INSECTS INJURIOUS TO FORESTS

ENGELMANN SPRUCE KILLED BY BEETLE
 ABOUT 1853-6. PIKE NATIONAL FOREST



ENGELMANN SPRUCE KILLED BY FIRE
AND THE ENGELMANN SPRUCE BEETLE
IN THE LINCOLN NATIONAL FOREST



INSECTS INJURIOUS TO FORESTS

ENGELMANN SPRUCE KILLED BY THE
BEETLE AND SWEEPED BY FIRE IN PIKE
NATIONAL FOREST

This injury is best prevented by prompt utilization of timber within a few months after it is dead or found to be past recovery; by removing the bark from the merchantable portion of the trunk within a few weeks after the trees are dead; by felling the trees and placing the unbarked logs in water; or by the adoption of a system of forest management which will provide for the prompt utilization of all trees dying from any cause.

INSECT INJURIES TO FOREST PRODUCTS

Damage is caused by various species of insects which are attracted by the varying conditions prevailing at different stages during the process of utilizing the forest resources from the time the trees are felled until the logs are converted into the crude and finished product, and until the latter reaches the final consumer or until after it is placed in the finished article or structure. As a result additional drains are made upon the timber to meet the demands for higher grades of lumber and for other supplies to replace those injured or destroyed. Dr. Hopkins states that from his personal investigations of this subject it is evident that the damage to forest products of various kinds from this cause is far more extensive than is generally realized. This loss differs from that resulting from insect damage to standing timber in that it represents more directly a loss of money invested in material and labor.

Injury to crude products, such as round timber with the bark on, poles, posts, mine props, saw-logs, etc., is caused by the same class of insects. The damage is especially severe when material is handled in such a manner as to offer favorable conditions for attack, as when the logs are left in the woods on skidways or in mill yards for a month or more after they have been cut from the living tree. Round-headed borers, timber worms and ambrosia beetles are all serious enemies of timber under such conditions.

Ambrosia beetles and other wood borers also attack freshly sawed hardwood placed in close piles during warm, damp weather during the period from June to September, and wood borers injure lumber and square timbers of both soft and hardwoods with the bark left on the edges, the borers hatching from eggs deposited in the bark before or after the lumber is sawed. Seasoned products in yards and storehouses suffer from the powder-post beetle, and old hemlock and oak tan bark is often so badly damaged by various insects which infest dead and dry bark that in some tan yards as much as 50 to 75 per cent of the bark that is over three years old is destroyed. The greatest loss of finished hardwood products such as handle, wagon, carriage and machinery stock is caused by powder-post beetles, and these, together with white ash or other wood-boring insects, follow the product into its finished state in implements, machinery, wagons, furniture and inside finish.

The control and prevention of such injuries as these offer less difficulties than that in many other branches of the general subject of forest insect control. In most cases the principle of prevention is the only one to be considered, since the damage is done soon after the insects enter the wood so the wood cannot be repaired by destroying the enemy. A great deal depends upon the proper degree of moisture and the period of danger varies with the kind of timber and the time of year it is felled. This applies to crude products, and, in a measure, to manufactured seasoned products. The general principles of control are on the same lines as those indicated in the other sections, and may be summed up in the general statement of prompt utilization and care in the conditions of storage. In utilized products material may also be treated with preservative.

INSECTS IN THEIR RELATION TO FUTURE SUPPLY OF TIMBER AND GENERAL PRINCIPLES
OF CONTROL

In the final circular of the series Dr. Hopkins states that investigations conducted by him and his assistants in all sections of the country during the past ten years indicate to them that the average percentage of loss in merchantable timber in the forests of the country to be charged to the insects is infinitely greater than most people realize. The author's estimates for a ten-year period have already been given.

Insect-killed timber makes, as is well known, better fuel for forest fires and fire contributes to the multiplication of insects which depredate on the bark and wood of dying and dead trees, so that in forested areas where fires are frequent, the damage to the wood of such trees is more severe, and fewer injured trees recover on account of the abundance of secondary bark beetle enemies which do not as a rule attack and kill living timber. Sometimes, when the infested areas are swept by fire, the broods of insects are destroyed and therefore complete fire control may easily contribute to more extended depredations by insects on living timber, thus increasing rather than diminishing the need for insect control. The setting of fires, however, or permitting them to burn for the purpose of combatting insects, should never be undertaken or permitted. Insect-killed timber could often be profitably utilized were it not for the secondary attacks of wood-boring insects and the destruction of insect-killed timber by forest fires. Injury by insects also often opens the way for fungi, although certain species and groups of both insects and fungi are trees.

It is admittedly difficult to estimate losses in terms of board feet, or dollars, there are so many contributing factors; but those estimates that are made in these circulars are the best that can be presented on available evidence. On this basis the author estimates the loss of standing timber killed or damaged by insects at an equivalent of more than ten per cent of the quantity and stumpage value of the total stand of merchantable timber in the United States at any given time. Considering this in its various relations to the nation's wealth and welfare and its effect on land values, it is difficult to estimate the loss chargeable to insects. Considered from the standpoint of loss in cash revenue, it means an annual loss in timber and its products of more than one hundred million dollars.

PREVENTION AND CONTROL

It is, as a rule, useless to attempt to exterminate. The insect forces must be weakened 75 per cent or more to have the control effective, and this can be done by proper management. The author lays great stress upon forest management, but urges that any adjustment or modification in management or business methods should be based on expert technical knowledge of the species, habits, life-history and natural enemies of the insects involved, supplemented by expert knowledge of principles of technical and applied forestry, and by practical knowledge and experience as to local conditions.

The value of natural checks and factors of control of injurious insects without which such control would be impossible is dwelt upon. These natural factors consist of parasitic and predatory insects, diseases of insects, birds and climatic conditions, and all of them play an important part which can be more or less controlled by man in accomplishing the results. Finally he urges the prompt utilization of all insect-infested timber, so that losses may be limited as much as possible; especially as by so doing we can contribute more, perhaps, than in any other way to the reduction of the insects to or below their normal numbers and thus provide against serious injury in the future.

In reading the circulars upon which this article is based it must be borne in mind that they represent a body of knowledge which is still rapidly progressing. Some later facts are indeed mentioned in this article. The principles embodied in them, however, are well established, and it is the practice under those principles that is being perfected. Nor are these publications intended to be complete lists of the insects injurious to our forests. They include only those types that are of most importance and of which the Bureau of Entomology has sufficiently complete data to know how to deal with them.



BAMBOO PULP AS THE PAPER MATERIAL OF THE FUTURE

By HARRY VINCENT

THAT bamboo pulp is the one material that is likely to come to the front as a main source of paper stock supply, is the opinion of the *World's Paper Trade Review* of London (February 24, 1911). The difficulty heretofore has been in the bleaching, as the coloring matter could not be eliminated except by the expensive caustic soda process. This has now been obviated. The great advantage that bamboo has over other pulp material is in the growing. A piece of land once established in bamboo can be cut over annually for an indefinite period, as given a favorably watered situation, and preferably a gravelly soil, the bamboo in the tropics grows to an altitude of thirty feet or more yearly. As it requires but a three-year period to establish a field, it is perfectly plain that neither wood nor any other material can compete with it. As the United States has control over large territories in Porto Rico and the Panama Zone most suitable for bamboo cultivation (which is extremely simple) there should be no difficulty in getting a permanent future supply up to millions of tons a year.

The advantages of bamboo as a pulp maker are: (1) It has a good, strong vegetable fiber; (2) it is in general easily accessible for water transport; (3) it is cheap and easily collected; (4) it is available in large quantities and abundant within a given area; (5) it is available for a regular and constant

supply, and not subject to violent fluctuations either in quality or price; (6) it admits of simple and ready treatment, mechanical, chemical or both, for easy and inexpensive conversion into bleached pulp; (7) land established in bamboo, which will take three years from first planting to reach a height of thirty to forty feet, can then be reaped annually for an indefinite period.

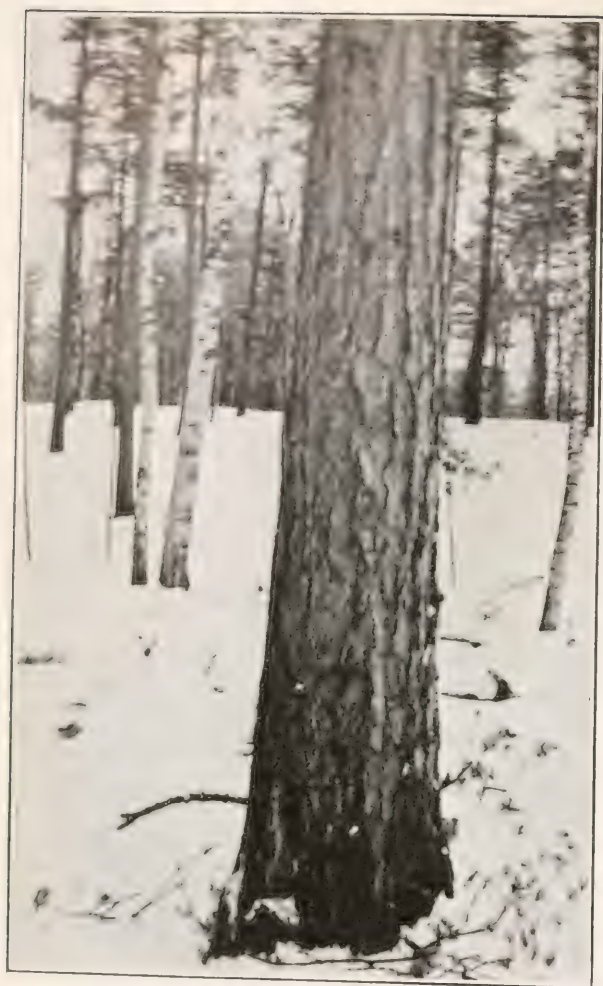
Ordinary thick-walled bamboo, which, when given suitable soil and climate, grows with amazing rapidity and yields annually at least forty tons to the acre, contains fifty per cent of a very strong, yet fine and flexible, fibre, easily digested by the ordinary bi-sulphite process, and by a new method simply and inexpensively bleached, yielding when properly treated an excellent pulp, felting readily, and producing a paper, pliant, resistant and opaque, of enduring color, thicker than other paper of the same weight, and forming one of the very finest of materials for writing and printing, and of exceptional value for engraving.

The oldest bamboo is thoroughly and completely digested, knots and all, by the ordinary bi-sulphite process; but care must be taken in the cooking, as there is no reason to suppose that all bamboos are alike. Pine spruce, and poplar are treated quite differently in cooking, and nearly every factory has its own formula, and different strengths and temperatures are used. Direct steam should never be used with bamboo, but always steam coils with not more than forty pounds pressure until the last two hours, after first liberating the gases derived from bamboo which are different from those of wood. The mechanical portion which is absolutely essential to this process is a preparation of the bamboo for cooking as well as for bleaching. After being selected and assorted the bamboo has to be crushed in exactly the same manner as sugar cane, when it will appear after removal of the sap somewhat similar to mogass, almost pulverized and a slightly damp, spongy mass. In this form the bamboo is extremely permeable by the cooking solution, which can be used comparatively weak and without any necessity for a high pressure of steam. In all cases a solution to be used with bamboo should be as nearly neutral as possible. It may be slightly alkaline or slightly acid, but excess in either direction will waste a large amount of the fine fibres, and acts adversely on the chemical constituents of bamboo. These fine fibres are, according to Wildridge and Ekman, of great value in forming a close, opaque sheet of paper. They represent about a third of the cellulose, and unless the necessary precautions are adopted, they will be lost in the strainers and washers. So, obviously no part of the preparatory treatment can be carried out away from the place of growth of the bamboo.

The bleaching process is entirely new and differs from any other used for making pulps. It consists in an intermediate process the object of which is to prepare the pulp for bleaching, by steeping the bamboo after it has been cooked for a few hours in a solution made from electrolysed sea-water, salt, and diluted sulphuric acid, then after drawing off the solution (which can be used over and over again), giving the pulp a further bath in a very weak alkali and thoroughly washing it, when the whole coloring matter comes away, and a clean, fine and strong, light-colored pulp is left, which is now more easily bleached than any other pulp now in use. No other ingredients are necessary than those specified, which are of the cheapest possible description, and only a light electric current is required. The whole expense of the intermediate process will not add, including the bleaching, more than \$4 per ton to the cost of the pulp. Both the process and the apparatus for producing the solution (which makes use of a novel process in electrolysis) are patented, and there is no other known means of fully bleaching matured bamboo, except the antediluvian Chinese method of "retting."



BAMBOO



THE SMALL PICTURE WAS TAKEN
WITH A SMALL FIXED FOCUS
CAMERA, AND THE LARGE PICTURE
A REPRODUCTION OF FOUR TIMES



Under intelligent administration of tropical labor, especially under the farming system, which is so successful a feature of the sugar-cane industry in some of the West Indian islands, the raw material should not cost more than \$2 per long cord (approximately a ton), delivered at the mill, and the total cost per ton of pulp at a factory turning out 1,000 tons per month should not exceed \$30 for a high-grade bleached pulp, worth, at an extremely modest estimate, \$50.

To epitomize, the bamboo is the cheapest of all materials; the bi-sulphite is the cheapest of all chemical processes, and the new method of bleaching is much cheaper than any other method in present use.

[NOTE. The search for paper pulp material to meet the great and growing demand is of the greatest interest. The increasing scarcity and cost of spruce has already led to successful experiments with other woods, formerly disregarded, but experimenters are continually looking for material which can be grown more rapidly than trees. The foregoing article suggests a possible promising source of supply, but it must be remembered that bamboo is a tropical product and that our mills, representing an enormous investment, are in the North. The utilization of bamboo on a large commercial scale would involve a considerable readjustment of the pulp industry, and the solving of many questions, among which that of labor would not be the least. It can, therefore, hardly be regarded as a possibility of the immediate future, although well worth consideration in connection with an ultimate supply.—EDITOR.]



THE PLEASURES OF A SMALL CAMERA

By R. S. KELLOGG

IN THIS day of take-down guns, condensed foods, and pocket editions, the small, high-powered camera fills a distinct need. The camper who goes into new country with his outfit on his back, the tourist who is already loaded with luggage, the scientist who carries necessarily heavy instruments, the every-day lover of the outdoors—all these observers find many a bit of scenery, many a tree or waterfall, rock or habitation, which they would give much to reproduce later at home, in office, laboratory or school room. To such as these, mere weight and bulk forbid the use of the ordinary camera, plates and tripod, which have long been thought essential to the production of good pictures. And to them the small, light, high-powered, fixed-focus, film camera has a wide range of pleasure and usefulness. Such a camera is always ready for action; it can be snapped almost as quickly as a gun can be fired and with as much accuracy. It is sighted like a gun, the object is seen at the instant of exposure, and bodies in motion are taken as readily as those at rest.

Moreover, such an instrument fills the long-felt want of a camera which will give depth and definition in snapshots and even on cloudy days. Its possessor is, therefore, much less limited by conditions and obtains a much larger percentage of good negatives than is possible with the old-style machines. None but the professional photographer who waits until every condition is exactly right can hope to get perfect results. The rest of us want an instrument that will record fairly well the passing scene at the instant we happen along; we can't wait for conditions to become favorable—the shot must be made then or not at all. With our old cameras we kept snapping away and trusting to luck for occasional good results. With the new kind we do better and are content to sacrifice size of negative for depth and definition under conditions that formerly gave neither.

Now we have an instrument weighing only two and one-half pounds, case and all, that we can carry anywhere and at any time, that works well under adverse conditions, which gives negatives that can be greatly enlarged if desired and which are especially adapted to making slides and illustrating articles. After carrying large cameras for a long time, the writer is thoroughly converted to the use of a small one. He prefers the $1\frac{5}{8} \times 2\frac{1}{2}$ to the 5×7 for several reasons, but chiefly because he gets many pictures that with a larger instrument he would not have gotten at all. The camera is taken along now where it was formerly left at home, and the size of the negative is of little importance if quality be present.

The accompanying samples partially show the possibilities of the small hand camera. All of them are snapshots, the exposures varying from 1-30 to 1-500 of a second. The first four were taken on a day of complete cloudiness, the others in bright sunshine.



A BUNK HOUSE
IN THE WOODS

THE FOREST
PRIMEVAL
WHITE AND
NORWAY PINE



SHORE LINE OF
A WISCONSIN LAKE

LOG POND
AND SAWMILL



A CROOKED TREE ON THE
RIVER BANK

SEEING THE
COUNTY FAIR



EDITORIAL

OPENING OF THE FOREST FIRE SEASON

A LETTER just received from one of the oldest and best known forestry workers in the East says: "I am about crazy over forest fires which seem to rage hereabouts with more destruction and over greater area than ever before. We are doing the best we can to control them, but control is not the thing. Prevention is what is needed, and that will not come until public opinion deems a forest fire on a level with barn burning or the destruction by fire of any building not occupied by persons residing therein."

This is written from long experience and forms a good introduction to the numerous dispatches in newspapers from all sections of the country which give ample evidence that the forest fire season of 1911 has opened with a rush and that every resource will have to be called into action if we are to prevent a repetition during the coming season of the tragic experiences of last year. A long succession of increasingly dry years have supplied in our woods and forests all the conditions favorable to combustion. It remains to be seen how much we have profited by the lessons that have been administered to us with such unsparing severity.

Southern New England has been hard hit this spring, but the woodlands of Massachusetts and Connecticut are not of such magnitude as to offer the spectacular conflagrations of the lake states and the Northwest. Maine has its fires under comparative control, and we look for similar efficiency under the new state system in New Hampshire, combined with a strong organization of the large timberland owners. Vermont has not been a heavy sufferer, and it, too, has strengthened its defences. But none of these states are free from the scourge, and the words quoted at the beginning of this article are from a state that has been a leader in the efficiency of its forestry organization.

In the lake states much study has been given to the subject of fire control since the terrible visitation of last year and improved state organizations, especially in Minnesota, and the Northern Protective Association, made up of timberland owners of Wisconsin and Michigan, are new factors that should prove their worth this season.

In the national forests everything has been done to strengthen the weak spots in accordance with the lessons of last summer, as far as an inadequate appropriation will permit, but it is an unequal struggle that is forced by present conditions upon the efficient and courageous men of the Forest Service. From a straight business standpoint a larger investment would bring better returns. Mr. Allen's article in this magazine shows what the Western Forestry and Conservation Association, the pioneer protective organization of timberland owners, has been able to accomplish in the northwestern forests. These results, it must be remembered, have been obtained by following Forest Service methods, under men trained in the Forest Service; but these private owners apply these methods thoroughly, as good business demands, while Congress

compromises with the political enemies of the national forest system and refuses an appropriation adequate for thoroughly effective work.

There have, however, unquestionably been great improvements in efficiency all along the line, and we may fairly hope to see some results this season in the checking of conflagrations. The new cooperative arrangements between the national and state governments, which are already being entered into and will be made as fast as possible with states that can qualify for such cooperation, are an important step forward and will, without a shadow of doubt, be productive of valuable results.

In forming judgment as to the results of defensive work during the season there must always be borne in mind the natural difficulties, pointed out so clearly by our fair-minded German critic, Dr. Deckert, in the article of which we recently published a translation. In the great forests of our western mountains ideal conditions of safety cannot be brought about except in a long term of years. In the populous eastern states, however, with their wealth of resources, there can be no reason for heavy forest fires except general public negligence and parsimony. Upon those whose carelessness causes the fires and upon the legislators who fail to provide sufficient police and preventive organization rests a heavy burden of responsibility. The carelessness of the American people with regard to the annual fire loss is a national disgrace, but if we gave half the attention to preventing the burning of forests, which cannot be replaced or insured, that we do to the burning of buildings, which can be both insured and replaced, we should be in much safer condition than we are today.

A NATIONAL FOREST AT THE NATIONAL CAPITAL

WE BESPEAK a thoughtful and sympathetic reading of Mr. Ellicott's article on the project to which he has given so much unselfish thought and effort, of a national forest to include the large area of wooded lands between the cities of Washington and Baltimore, and a strip along the Potomac near Great Falls. This proposal is in line with what we are beginning to learn of the value of the forest for its products, its beauty, and the opportunity that it gives for recreation. We are learning that forestry is not alone for the great mountain wilderness. That our urban communities have need of it, and that those which are fortunate enough to be able to acquire municipal forests should do so while the opportunity is here.

Washington is peculiarly favored in this respect. The country about it is not so fully populated as to make land values high or to prevent the acquisition of large areas for forestry purposes. Moreover, the natural conditions, as Mr. Besley's report shows, clearly suggest the proposed treatment. The resources of the nation stand behind the development and beautification of its capital city. Here is the headquarters of the United States Forest Service, which could make the best use of a forest at its doors for either scientific or practical demonstration, and this could be done with the greatest economy. As has also been well suggested, the Department of Agriculture might have experimental farms in the area which would be of value to the department and would be most accessible for study by the interested public.

The ancient Swiss city of Zürich holds its great municipal forest, the Sihlwald, among its proudest possessions, and it draws therefrom a rich annual income both in cash revenue and in the healthful enjoyment of its people.

This is possible for Washington on an even larger scale as becomes the capital of this great nation. The project appeals both to the imagination and to every-day business sense. The environs of Washington today are not a credit to the city or the nation. While we are spending millions for public buildings, why not designate a very few of these millions to make a fit setting for the national city we are building?

THE SUPREME COURT DECISIONS

THE recent decisions of the Supreme Court of the United States in the California and Colorado grazing cases are an important milestone in our national development. For a long time the interests inimical to the national forests have been looking forward to a possible victory on the issues involved in these cases, which would give the control of the national forests over to the states in which they lie. So much hope for this did the state authorities of Colorado see in the *Light* case that the attorney general of the state came on and aided the appellant. At the first hearing of the California cases the court divided, but when the cases were reopened the court held unanimously for the government on every point. So thoroughly were the issues gone into that the court itself undoubtedly gained a much fuller appreciation of their gravity than it had at the beginning. Every possible point was raised against federal control, with the idea of making these test cases.

In the California cases the main question at issue was the right of the Secretary of Agriculture to make regulations for the management of the national forests and the authority of these regulations when made, the defendants—Grimaud, Carajous, and Inda—claiming that these regulations usurped the powers of Congress, which could not delegate its legislative powers, and were therefore void.

The court admitted the difficulty of drawing the line in many cases, between legislative and administrative functions, but found no difficulty in these cases, the exercise of powers by the Secretary of Agriculture being purely administrative and fully sanctioned by the various acts creating the forests and giving him authority over them. "The authority to make administrative rules," says the Court, "is not a delegation of legislative power, nor are such rules raised from an administrative to a legislative character, because the violation thereof is punished as a public offence." The decision of the lower court, which sustained the demurrer of the defendant, was reversed.

Every forest officer can breathe a little easier for this decision, knowing that the highest judicial authority in the land has sustained the legality of the rules he is administering.

The *Light* case, which came up on appeal of *Light*, a Colorado ranchman, convicted in the circuit court of wilfully violating the regulations governing the national forests and turning his cattle into the Holy Cross forest without a permit, involved the question of state or federal control of the public lands, since the defendant claimed the benefit of the Colorado statute requiring the owner of land to erect and maintain a fence of a given height and strength, and it was further contended that Congress could not withdraw large bodies of land from settlement without the consent of the state in which such lands are located. This claim, of course, struck at the very foundation of the national forest system, but the disposition of it by the Court was sweeping and complete. The United States is an owner with full control over its own

property and that control is vested in Congress. Against the contention of some of the western states that the public lands are held in trust for the people of those states, the Court sets up the broader doctrine that "All the public lands of the nation are held in trust for the people of the whole country," and it is for Congress, not the courts, to determine how that trust should be administered.

To those who have followed the discussion of questions relating to the powers of the national government with regard to public lands, it will be evident that these decisions of a united court settle clearly and finally the fundamental questions of the rights of the nation as an owner, the legislative powers of Congress, and the administrative powers of the executive department, which may be in charge of such lands. The development of a national policy for dealing with our natural resources can now proceed with surer footing along a road more fairly marked.

A FORCED ISSUE

THE REGRET to see *Mining Science* giving currency to sensational reports of unrest in Alaska caused, it is alleged, by the regulations of the national Forest Service. According to the correspondent of *Mining Science*, the only remedy is the purchase of Alaska by Canada. The chief sponsor for this amazing proposal is a Canadian "who has important holdings in the province (British Columbia) and territory." A great deal is said by this gentleman about the unsatisfactory boundary and the difficulty of operating on both sides of the line. It is not a new suggestion that the Alaskan boundary is unsatisfactory to Canadians. But what has that to do with the rules of the Forest Service? It almost always happens that an international boundary line is unsatisfactory if there is a considerable amount of natural wealth on both sides of the fence. Two or three citizens of this country who have had mining interests in the North are quoted as agreeing with the Canadian.

The grievance at the root of all these complaints is the familiar one of men who find that the great property purchased of Russia, through Secretary Seward's foresight, by and for the whole nation, cannot be used solely for the immediate profit of a few individuals, but is to be guarded and maintained as a permanent contributor to the general welfare. It is undoubtedly true that a check has been placed temporarily upon the development of the resources of Alaska, but the responsibility for this lies not with the very reasonable rules of the Forest Service, but its root is to be found in the attempts which have been made by large moneyed interests to exploit these resources for their own benefit and without much regard to national regulations. Under these circumstances it became necessary to call a halt, and if many enterprising and self-reliant individuals who have gone into Alaska to better their fortunes have suffered somewhat by this delay, it is to be regretted, but it is difficult to see how it could be prevented and the interest of the greater number be properly protected.

It is quite natural that men who have gone into the wilderness and stood alone, measuring their strength against the strength of the frozen North until they seemed to be the center of the universe, should find it difficult to turn their gaze backward to the increasing millions whom they left behind them, and to reduce the colossal fortunes of their dreams to a reasonable share in that

which they did not create or pay for, but which nature and the United States government placed in the hands of this nation.

One of those quoted in the article to which we have reference says that two-thirds of the sixty thousand inhabitants of the territory are aborigines, and that the white population is about one-fourth of what it was ten years ago. Does this man think that releasing control to some of our great financial interests would increase materially the white population of the country? There can be little doubt from the present trend of things that if the government got out, these interests would get in and but few smaller operators would benefit by the change. The government does not shut out regulated private enterprise. The other type of ownership would.

But there remains that suggestion of a sale to Canada, which our Canadian friend thinks could develop Alaska better than the United States. Does he take into account the fact that we know something about Alaska now, and that the price has risen since its purchase from Russia? Not only would a great and somewhat inhospitable territory have to be bought, but a vast amount of known and potential forest and mineral property. We question whether Canada could pay the price, which would be staggering in its size.



THE GRAZING CASES DECIDED

(Opinion of the Supreme Court in the California and Colorado National Forest Cases)

On the first of May the Supreme Court of the United States handed down decisions in the grazing cases which were fixed upon by the enemies of the national forests to test their legality and that of the regulations adopted for their control. The first of these cases was that of *The United States*, plaintiff in error, v. *Pierre Grimaud and J. P. Carajous*, with which was joined that of the same v. *Antonio Inda*. Both of these cases were brought up from the District Court of the United States for the Southern District of California.

OPINION OF THE COURT.

By the act of March 3, 1891 (26 Stat., 1103), the President was authorized, from time to time, to set apart and reserve, in any State or Territory, public lands, wholly or in part covered with timber or undergrowth, whether of commercial value or not, as public forest reservations. And by the act of June 4, 1897 (30 Stat., L. 35), the purposes of these reservations were declared to be "to improve and protect the forest within the reservation, and to secure favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States." * * * "All water on such reservations may be used for domestic, mining, milling or irrigation purposes, under the laws of the State wherein such forest reservations are situated, or under the laws of the United States and the rules and regulations established thereunder." (30 Stat., 36.)

It is also provided that nothing in the act "should be construed as prohibiting the egress and ingress of actual settlers residing within the boundaries of such reservation," * * * "nor shall anything herein * * * prohibit any person from entering upon such forest reservation for all proper and lawful purposes, * * * provided that such persons comply with the rules and regulations covering such forest reservation."

There were special provisions as to the sale of timber from any reserve (except those in the State of California, 30 Stat., 35; 31 Stat., 661), and a requirement that the proceeds thereof and from any other forest source should be covered into the Treasury, the act of February 1st, 1905 (33 Stat., 628), providing that "all money

received from the sale of any products or the use of any land or resources of said forest reserve shall be covered into the Treasury of the United States for a period of five years from the passage of this act, shall constitute a special fund available, until expended, as the Secretary of Agriculture may direct, for the protection, administration, improvement and extension of Federal Forest Reserves."

The act of 1905, as to receipts arising from the sale of any products or the use of any land was, in some respects, modified by the act of March 4, 1907. It provided that all moneys received after July 1, 1907, by or on account of forest service timber, or from any other source of forest reservation revenue, shall be covered into the Treasury, "provided that ten per cent of all money received from each forest reserve during any fiscal year, including the year ending June 30, 1906, shall be paid at the end thereof by the Secretary of the Treasury to the State or Territory in which said reserve is situated, to be expended, as the State or Territorial legislature may prescribe, for the benefit of the public schools and public roads in the county or counties in which the forest reserve is situated," 34 Stat., 1270.

The jurisdiction, both civil and criminal, over persons within such reservation was not to be affected by the establishment thereof "except so far as the punishment of offenses against the United States therein is concerned; the intent being that the State shall not by reason of the establishment of the reserve lose its jurisdiction, nor the inhabitants thereof their rights and privileges as citizens, or be absolved from their duty as citizens of the State."

The original act provided that the management and regulation of these reserves should be by the Secretary of the Interior, but in 1905 that power was conferred upon the Secretary of Agriculture (33 Stat., L. 628), and by virtue of those various statutes he was authorized to "make provision for the protection against destruction by fire and depredations upon the public forests and forest reservations * * * ; and he may make such rules and regulations and establish such service as will insure the objects of such reservation, namely, to regulate their occupancy and use, and to preserve the forests thereon

from destruction; and any violation of the provisions of this act or such rules and regulations shall be punished as prescribed in Rev. Stat., 5388," which, as amended, provides for a fine of not more than five hundred dollars and imprisonment for not more than twelve months, or both, at the discretion of the court. 26 Stat., 1103; 30 Stat., 34; 30 Stat., 35; 31 Stat., 661; 33 Stat., 36; 7 Fed. Stat. Anno., 310-317, 296, Supp. 1909, p. 634.

Under these acts the Secretary of Agriculture, on June 12, 1906, promulgated and established certain rules for the purpose of regulating the use and occupancy of the public forest reservations and preserving the forests thereon from destruction, and among those established was the following:

"Regulation 45. All persons must secure permits before grazing any stock in a forest reserve, except the few head in actual use by prospectors, campers and travelers and milch or work animals, not exceeding a total of six head, owned by *bona fide* settlers residing in or near a forest reserve, which are excepted and require no permit."

The defendants were charged with driving and grazing sheep on a reserve, without a permit. The grand jury in the District Court for the Southern District of California, at the November term, 1907, indicted Pierre Grimaud and J. P. Carajous, charging that on April 26, 1907, after the Sierra Forest Reserve had been established, and after regulation 45 had been promulgated, "they did knowingly, wilfully and unlawfully pasture and graze and cause and procure to be pastured and grazed certain sheep (the exact number being to the grand jurors unknown) upon certain land within the limits of and a part of said Sierra Forest Reserve, without having theretofore or at any time secured or obtained a permit or any permission for said pasturing or grazing of said sheep or any part of them, as required by the said rules and regulations of the Secretary of Agriculture," the said sheep not being within any of the excepted classes. The indictment concluded, "contrary to the form of the statutes of the United States in such case made and provided, and against the peace and dignity of the said United States."

The defendants demurred, upon the ground (1) that the facts stated did not constitute a public offense, or a public offense against the United States, and (2) that the acts of Congress making it an offense to violate rules and regulations made and promulgated by the Secretary of Agriculture are unconstitutional, in that they are an attempt by Congress to delegate its legislative power to an administrative officer." The court sustained the demurrers (170 Fed., 205), and made a like ruling on the similar indictments in

U. S. v. Inda. 216 U. S., 614. Both judgments were affirmed by a divided court. Afterwards petitions for rehearing were granted.

Mr. Justice Lamar, after making the foregoing statements, delivered the opinion of the Court.

The defendants were indicted for grazing sheep on the Sierra Forest Reserve without having obtained the permission required by the regulations adopted by the Secretary of Agriculture. They demurred on the ground that the Forest Reserve Act of 1891 was unconstitutional, in so far as it delegated to the Secretary of Agriculture power to make rules and regulations and made a violation thereof a penal offense. Their several demurrers were sustained. The Government brought the case here under that clause of the Criminal Appeals Act (34 Stat., 1246), which allows a writ of error where the "decision complained of was based upon the invalidity of the statute."

The Federal courts have been divided on the question as to whether violations of those regulations of the Secretary of Agriculture constitute a crime. The rules were held to be valid for civil purposes in *Dastervignes v. United States*, 122 Fed., 30; *United States v. Dastervignes*, 118 Fed., 199; *United States v. Shannon*, 151 Fed., 863; *Ibid.* 160 Fed., 870. They were also sustained in criminal prosecutions in *United States v. Deguirro*, 152 Fed., 568; *United States v. Domingo*, 152 Fed., 566; *United States v. Bale*, 156 Fed., 687; *United States v. Rizzinelli*, 182 Fed., 675. But the regulations were held to be invalid in *United States v. Blasingame*, 116 Fed., 654; *United States v. Matthews*, 146 Fed., 306; *United States v. Dent*, 8 Ariz., 138.

From the various acts relating to the establishment and management of forest reservations it appears that they were intended "to improve and protect the forest and to secure favorable conditions of water flows." It was declared that the acts should not be "construed to prohibit the egress and ingress of actual settlers" residing therein nor "to prohibit any person from entering the reservation for all proper and lawful purposes, including prospecting, and locating and developing mineral resources; provided that such persons comply with the rules and regulations covering such forest reservation." (Act of 1897, 30 Stat., 36.) It was also declared that the Secretary "may make such rules and regulations and establish such service as will insure the objects of such reservation, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction; and any violation of the provisions of this act or such rules and regulations shall be punished" as is provided in Sec. 5388 of the Revised Statutes, as amended.

Under these acts, therefore, any use of the reservation for grazing or other lawful purpose was required to be subject to the rules and regulations established by the Secretary of Agriculture. To pasture sheep and cattle on the reservation, at will and without restraint, might interfere seriously with the accomplishment of the purposes for which they were established. But a limited and regulated use for pasturage might not be inconsistent with the object sought to be attained by the statute. The determination of such questions, however, was a matter of administrative detail. What might be harmless in one forest might be harmful to another. What might be injurious at one stage of timber growth, or at one season of the year, might not be so at another.

In the nature of things it was impracticable for Congress to provide general regulations for these various and varying details of management. Each reservation had its peculiar and special features; and in authorizing the Secretary of Agriculture to meet these local conditions Congress was merely conferring administrative functions upon an agent, and not delegating to him legislative power. The authority actually given was much less than what has been granted to municipalities by virtue of which they make by-laws, ordinances and regulations for the government of towns and cities. Such ordinances do not declare general rules with reference to rights of persons and property, nor do they create or regulate obligations and liabilities, nor declare what shall be crimes nor fix penalties therefor.

By whatever name they are called they refer to matters of local management and local police. *Brodhine v. Revere*, 182 Mass., 599. They are "not of legislative character in the highest sense of that term; and as an owner may delegate to his principal agent the right to employ subordinates, giving them a limited discretion, so it would seem that Congress might rightfully entrust to the local legislature (authorities) the determination of minor matters." *Butte City Water Co. v. Baker*, 165 U. S., 126.

It must be admitted that it is difficult to define the line which separates legislative power to make laws, from administrative authority to make regulations. This difficulty has often been recognized, and was referred to by Chief Justice Marshall in *Wayman v. Southard*, 10 Wheat., 42, where he was considering the authority of courts to make rules. He there said: "It will not be contended that Congress can delegate to the courts, or any other tribunal, powers which are strictly and exclusively legislative. But Congress may certainly delegate to others, powers which the legislature may rightfully exercise itself." What were these non-legislative powers which Con-

gress could exercise but which might also be delegated to others, was not determined, for he said: "The line has not been exactly drawn which separates those important subjects which *must* be entirely regulated by the legislature itself, from those of less interest, in which a general provision may be made, and power given to those who are to act under such general provision to fill up the details."

From the beginning of the Government various acts have been passed conferring upon executive officers power to make rules and regulations—not for the government of their departments, but for administering the laws which did govern. None of these statutes could confer legislative power. But when Congress had legislated and indicated its will, it could give to those who were to act under such general provisions "power to fill up the details" by the establishment of administrative rules and regulations, the violation of which could be punished by fine or imprisonment fixed by Congress, or by penalties fixed by Congress or measured by the injury done.

Thus it is unlawful to charge unreasonable rates or to discriminate between shippers, and the Interstate Commerce Commission has been given authority to make reasonable rates and to administer the law against discrimination. *Int. Com. Com. v. Ill. Cent. R. R.*, 215 U. S., 452; *Int. Com. Com. v. Chicago, Rock Island, &c., R. R.*, 218 U. S., 88. Congress provided that after a given date only cars with drawbars of uniform height should be used in interstate commerce, and then constitutionally left to the Commission the administrative duty of fixing a uniform standard. *Saint Louis & Iron Mountain R. R. v. Taylor*, 210 U. S., 287. In *Union Bridge Co. v. United States*, 204 U. S., 364; *In re Kollock*, 165 U. S., 526; *Butterfield v. Stranahan*, 192 U. S., 470, it appeared from the statutes involved that Congress had either expressly or by necessary implication made it unlawful, if not criminal, to obstruct navigable streams; to sell unbranded oleomargarine; or to import unwholesome teas. With this unlawfulness as a predicate the executive officers were authorized to make rules and regulations appropriate to the several matters covered by the various acts. A violation of these rules was then made an offense punishable as prescribed by Congress. But in making these regulations the officers did not legislate. They did not go outside of the circle of that which the act itself had affirmatively required to be done, or treated as unlawful if done. But confining themselves within the field covered by the statute they could adopt regulations of the nature they had thus been generally authorized to make, in order to administer the law and carry the statute into effect.

The defendants rely on *United States v.*

Eaton, 144 U. S., 677, where the act authorized the Commissioner to make rules for carrying the statute into effect, but imposed no penalty for failing to observe his regulations. Another section (5) required that the dealer should keep books showing certain facts, and providing that he should conduct his business under such surveillance of officers as the Commissioner might by regulation require. Another section declared that if any dealer should knowingly omit to do any of the things "required by law" he should pay a penalty of a thousand dollars. *Eaton* failed to keep the books required by the regulations. But there was no charge that he omitted "anything required by law," unless it could be held that the books called for by the regulations were "required by law." The court construed the act as a whole and proceeded on the theory that while a violation of the regulations might have been punished as an offense if Congress had so enacted, it had, in fact, made no such provision so far as concerned the particular charge then under consideration. Congress required the dealer to keep books rendering return of materials and products, but imposed no penalty for failing so to do. The Commissioner went much further and required the dealer to keep books showing oleomargarine received, from whom received and to whom the same was sold. It was sought to punish the defendant for failing to keep the books required by the regulations. Manifestly this was putting the regulations above the statute. The court showed that when Congress enacted that a certain sort of book should be kept, the Commissioner could not go further and require additional books; or, if he did make such regulation, there was no provision in the statute by which a failure to comply therewith could be punished. It said that, "If Congress intended to make it an offense for wholesale dealers to omit to keep books and render returns required by regulations of the Commissioner, it would have done so distinctly"—implying that if it had done so distinctly the violation of the regulations would have been an offense.

But the very thing which was omitted in the oleomargarine act has been distinctly done in the Forest Reserve Act, which, in terms, provides that "any violation of the provisions of this act or such rules and regulations of the Secretary shall be punished as prescribed in section 5388 of the Revised Statutes as amended."

In *Union Bridge Co. v. United States*, 204 U. S., 386, Justice Harlan, speaking for the court, said:

"By the statute in question Congress declared in effect that navigation should be freed from unreasonable obstructions arising from bridges of insufficient height,

width of span or other defects. It stopped, however, with the declaration of a general rule and imposed upon the Secretary of War the duty of ascertaining what particular cases came within the rule prescribed by Congress, as well as the duty of enforcing the rule in such cases. In performing that duty the Secretary of War will only execute the clearly expressed will of Congress, and will not, in any true sense, exert legislative or judicial power."

And again he said in *Field v. Clark*, 143 U. S., 694:

"The legislature cannot delegate its power to make law, but it can make a law to delegate a power to determine some fact or state of things upon which the law makes or intends to make its own action depend. To deny this would be to stop the wheels of government. There are many things upon which wise and useful legislation must depend which cannot be known to the lawmaking power and must therefore be a subject of inquiry and determination outside of the halls of legislation." See also *Coha v. United States*, 152 U. S., 211; *United States v. Bailey*, 9 Pet., 238; *Cosmos Co. v. Gray Eagle Co.*, 190 U. S., 309; *Oceanic Navigation Co. v. Stranahan*, 214 U. S., 333; *Roughton v. Knight*, October Term, 1910; *Smith v. Whitney*, 116 U. S., 167; *ex parte Reed*, 100 U. S., 22; *Gratiot v. United States*, 4 How., 81.

In *Brodhine v. Revere*, 182 Mass., 599, a boulevard and park board was given authority to make rules and regulations for the control and government of the roadways under its care. It was there held that the provision in the act that breaches of the rules thus made should be breaches of the peace, punishable in any court having jurisdiction, was not a delegation of legislative power which was unconstitutional. The court called attention to the fact that the punishment was not fixed by the board, saying that the making of the rules was administrative, while the substantive legislation was in the statute which provided that they should be punished as breaches of the peace.

That "Congress cannot delegate legislative power is a principle universally recognized as vital to the integrity and maintenance of the system of government ordained by the Constitution." *Field v. Clark*, 143 U. S., 692. But the authority to make administrative rules is not a delegation of legislative power, nor are such rules raised from an administrative to a legislative character because the violation thereof is punished as a public offense.

It is true that there is no act of Congress which, in express terms, declares that it shall be unlawful to graze sheep on a forest reserve. But the statutes, from which we have quoted, declare, that the privilege of

using reserves for "all proper and lawful purposes" is subject to the proviso that the person so using them shall comply "with the rules and regulations covering said forest reservation." The same act makes it an offense to violate those regulations, that is, to use them otherwise than in accordance with the rules established by the Secretary. Thus the implied license under which the United States had suffered its public domain to be used as a pasture for sheep and cattle, mentioned in *Buford v. Houtz*, 133 U. S., 326, was curtailed and qualified by Congress, to the extent that such privilege should not be exercised in contravention of the rules and regulations. *Wilcox v. Jackson*, 13 Pet., 513.

If, after the passage of the act and the promulgation of the rule, the defendants drove and grazed their sheep upon the reserve, in violation of the regulations, they were making an unlawful use of the Government's property. In doing so they thereby made themselves liable to the penalty imposed by Congress.

It was argued that, even if the Secretary could establish regulations under which a permit was required, there was nothing in the act to indicate that Congress had intended or authorized him to charge for the privilege of grazing sheep on the reserve. These fees were fixed to prevent excessive grazing and thereby protect the young growth, and native grasses, from destruction, and to make a slight income with which to meet the expenses of management. In addition to the general power in the act of 1897, already quoted, the act of February 1st, 1905, clearly indicates that the Secretary was authorized to make charges out of which a revenue from forest resources was expected to arise. For it declares that "all money received from the sale of any products or the use of any land or resources of said forest reserve" shall be covered into the Treasury and be applied toward the payment of forest expenses. This act was passed before the promulgation of regulation 45, set out in the indictment.

Subsequent acts also provide that money received from "any source of forest reservation revenue" should be covered into the Treasury, and a part thereof was to be turned over to the Treasurers of the respective States to be expended for the benefit of the public schools and public roads in the counties in which the forest reserves are situated. (34 Stat., 684, 1270.)

The Secretary of Agriculture could not make rules and regulations for any and every purpose. *Williamson v. United States*, 207 U. S., 462. As to those here involved, they all relate to matters clearly indicated and authorized by Congress. The subjects as to which the Secretary can regulate are defined. The lands are set apart as a forest reserve. He is required to make provision to protect them from depreda-

tions and from harmful uses. He is authorized "to regulate the occupancy and use and to preserve the forests from destruction." A violation of reasonable rules regulating the use and occupancy of the property is made a crime, not by the Secretary, but by Congress. The statute, not the Secretary, fixes the penalty.

The indictment charges, and the demurrer admits, that Rule 45 was promulgated for the purpose of regulating the occupancy and use of the public forest reservation and preserving the forest. The Secretary did not exercise the legislative power of declaring the penalty or fixing the punishment for grazing sheep without a permit, but the punishment is imposed by the act itself. The offense is not against the Secretary, but, as the indictment properly concludes, "contrary to the laws of the United States and the peace and dignity thereof." The demurrers should have been overruled. The affirmances by a divided court heretofore entered are set aside and the judgments in both cases reversed.

LIGHT VERSUS THE UNITED STATES.

This case, *Fred Light*, appellant, v. *The United States*, was an appeal from the Circuit Court of the United States for the District of Colorado. The following statement was made by Mr. Justice Lamar:

The Holy Cross Forest Reserve was established under the provisions of the act of March 3, 1891. By that and subsequent statutes the Secretary of Agriculture was authorized to make provisions for the protection against destruction by fire and depredations of the public forest and forest reservations and "to make such rules and regulations and establish such service as would insure the objects of such reservation, namely, to regulate their occupancy and use, and to preserve the forests thereon from destruction." 26 Stat., L. 1103; 30 Stat., L. 35, Act of Congress February 1, 1905; 7 Fed. Stat. Ann., 310, 312, and Supp. for 1909, page 663. In pursuance of these statutes regulations were adopted establishing grazing districts on which only a limited number of cattle were allowed. The regulations provided that a few head of cattle of prospectors, campers and not more than ten belonging to a settler residing near the forest might be admitted without permit, but saving these exceptions the general rule was that "all persons must secure permits before grazing any stock in a national forest."

On April 7, 1908, the United States, through the district attorney, filed a bill in the Circuit Court for the District of Colorado reciting the matters above outlined, and alleging that the defendant Fred Light owned a herd of about 500 cattle and a ranch of 540 acres, located two and a half miles to the east and five miles to the north of the reservation. This herd was turned out to

range during the spring and summer, and the ranch then used as a place on which to raise hay for their sustenance.

That between the ranch and the reservation was other public and unoccupied land of the United States; but, owing to the fact that only a limited number of cattle were allowed on the reservation, the grazing there was better than on this public land. For this reason, and because of the superior water facilities and the tendency of the cattle to follow the trails and stream leading from the ranch to the reservation, they naturally went direct to the reservation. The bill charged that the defendant when turning them loose knew and expected that they would go upon the reservation, and took no action to prevent them from trespassing. That by thus knowingly and wrongfully permitting them to enter on the reservation he intentionally caused his cattle to make a trespass, in breach of the United States property and administrative rights, and has openly and privately stated his purpose to disregard the regulations, and without permit to allow and, in the manner stated, to cause his cattle to enter, feed and graze thereon.

The bill prayed for an injunction. The defendant's general demurrer was overruled.

His answer denied that the topography of the country around his ranch or the water and grazing conditions were such as cause his cattle to go on the reservation; he denied that many of them did go thereon, though admitting that some had grazed on the reservation. He admitted that he had liberated his cattle without having secured or intending to apply for a permit, but denied that he willfully or intentionally caused them to go on the reservation, submitting that he was not required to obtain any such permit. He admits that it is his intention hereafter, as heretofore, to turn his cattle out on the unreserved public land of the United States adjoining his ranch to the northeast thereof, without securing or applying for any permit for the cattle to graze upon the so-called Holy Cross Reserve; denies that any damage will be done if they do go upon the reserve; and contends that, if because of their straying proclivities, they shall go on the reserve, the complainant is without remedy against the defendant at law or in equity so long as complainant fails to fence the reserve as required by the laws of Colorado. He claims the benefit of the Colorado statute requiring the owner of land to erect and maintain a fence of given height and strength, in default of which the owner is not entitled to recover for damage occasioned by cattle or other animals going thereon.

Evidence was taken, and after hearing, the Circuit Court found for the Government

and entered a decree enjoining the defendant from in any manner causing, or permitting, his stock to go, stray upon or remain within the said forest or any portion thereof.

The defendant appealed and assigned that the decree against him was erroneous; that the public lands are held in trust for the people of the several States, and the proclamation creating the reserve without the consent of the State of Colorado is contrary to, and in violation of, said trust; that the decree is void because it in effect holds that the United States is exempt from the municipal laws of the State of Colorado relating to fences; that the statute conferring upon the said Secretary of Agriculture the power to make rules and regulations was an unconstitutional delegation of authority to him and the rules and regulations therefore void; and that the rules mentioned in the bill are unreasonable, do not tend to insure the object of forest reservation and constitute an unconstitutional interference by the Government of the United States with fence and other statutes of the State of Colorado, enacted through the exercise of the police power of the State.

Mr. Justice Lamar, after making the foregoing statement, delivered the opinion of the Court.

The defendant was enjoined from pasturing his cattle on the Holy Cross Forest Reserve, because he had refused to comply with the regulations adopted by the Secretary of Agriculture, under the authority conferred by the act of June 4, 1897 (30 Stat., 35), to make rules and regulations as to the use, occupancy and preservation of forests. The validity of the rule is attacked on the ground that Congress could not delegate to the Secretary legislative power. We need not discuss that question in view of the opinion in *United States v. Grimaud*, just decided.

The bill alleged, and there was evidence to support the finding, that the defendant, with the expectation and intention that they would do so, turned his cattle out at a time and place which made it certain that they would leave the open public lands and go at once to the Reserve, where there was good water and fine pasturage. When notified to remove the cattle, he declined to do so and threatened to resist if they should be driven off by a forest officer. He justified this position on the ground that the statute of Colorado provided that a landowner could not recover damages for trespass by animals unless the property was enclosed with a fence of designated size and material. Regardless of any conflict in the testimony, the defendant claims that unless the Government put a fence around the Reserve it had no remedy, either at law or in equity, nor could he

be required to prevent his cattle straying upon the Reserve from the open public land on which he had a right to turn them loose.

At common law the owner was required to confine his live stock, or else was held liable for any damage done by them upon the land of third persons. That law was not adapted to the situation of those States where there were great plains and vast tracts of unenclosed land, suitable for pasture. And so, without passing a statute, or taking any affirmative action on the subject, the United States suffered its public domain to be used for such purposes. There thus grew up a sort of implied license that these lands, thus left open, might be used so long as the Government did not cancel its tacit consent. *Buford v. Houtze*, 133 U. S., 326. Its failure to object, however, did not confer any vested right on the complainant, nor did it deprive the United States of the power of recalling any implied license under which the land had been used for private purposes. *Steele v. United States*, 113 U. S., 130; *Wilcox v. Jackson*, 13 Pet., 513.

It is contended, however, that Congress cannot constitutionally withdraw large bodies of land from settlement without the consent of the State where it is located; and it is then argued that the act of 1891 providing for the establishment of reservations was void, so that what is nominally a Reserve is, in law, to be treated as open and uninclosed land, as to which there still exists the implied license that it may be used for grazing purposes. But "the Nation is an owner, and has made Congress the principal agent to dispose of its property." * * * "Congress is the body to which is given the power to determine the conditions upon which the public lands shall be disposed of." *Butte City Water Co. v. Baker*, 196 U. S., 126. "The Government has with respect to its own land the rights of an ordinary proprietor to maintain its possession and prosecute trespassers. It may deal with such lands precisely as an ordinary individual may deal with his farming property. It may sell or withhold them from sale." *United States v. Canfield*, 167 U. S., 524. And if it may withhold from sale and settlement it may also as an owner object to its property being used for grazing purposes, for "the Government is charged with the duty and clothed with the power to protect the public domain from trespass and unlawful appropriation." *United States v. Beebe*, 127 U. S., 342.

The United States can prohibit absolutely or fix the terms on which its property may be used. As it can withhold or reserve the land it can do so indefinitely. *Stearns v. Minnesota*, 179 U. S., 243. It is true that the "United States do not and cannot hold property as a monarch may for private or personal purposes." *Van Brocklin v. Ten-*

nessee, 117 U. S., 158. But that does not lead to the conclusion that it is without the rights incident to ownership, for the Constitution declares, Sec. 3, Art. IV, that "Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or the property belonging to the United States." "The full scope of this paragraph has never been definitely settled. Primarily, at least, it is a grant of power to the United States of control over its property." *Kansas v. Colorado*, 206 U. S., 89.

"All the public lands of the nation are held in trust for the people of the whole country." *United States v. Trinidad Coal Co.*, 138 U. S., 160. And it is not for the courts to say how that trust shall be administered. That is for Congress to determine. The courts cannot compel it to set aside the lands for settlement; or to suffer them to be used for agricultural or grazing purposes; nor interfere when, in the exercise of its discretion, Congress establishes a forest reserve for what it decides to be national and public purposes. In the same way and in the exercise of the same trust it may disestablish a reserve, and devote the property to some other national and public purpose. These are rights incident to proprietorship, to say nothing of the power of the United States as a sovereign over the property belonging to it. Even a private owner would be entitled to protection against willful trespasses, and statutes providing that damage done by animals cannot be recovered, unless the land had been inclosed with a fence of the size and material required, do not give permission to the owner of cattle to use his neighbor's land as a pasture. They are intended to condone trespasses by straying cattle; they have no application to cases where they are driven upon unfenced land in order that they may feed there. *Lazarus v. Phelps*, 152 U. S., 81; *Moore v. Cannon*, 24 Mont., 324; *St. Louis Cattle Co. v. Vaught*, 1 Tex. App., 388; *The Union Pacific v. Rollins*, 5 Kans., 176.

Fence laws do not authorize wanton and willful trespass, nor do they afford immunity to those who, in disregard of property rights, turn loose their cattle under circumstances showing that they were intended to graze upon the lands of another.

This the defendant did, under circumstances equivalent to driving his cattle upon the forest reserve. He could have obtained a permit for reasonable pasturage. He not only declined to apply for such license, but there is evidence that he threatened to resist efforts to have his cattle removed from the Reserve, and in his answer he declares that he will continue to turn out his cattle, and contends that if they go upon the Reserve the Government has no remedy at law or in equity. This claim answers itself.

It appears that the defendant turned out

his cattle under circumstances which showed that he expected and intended that they would go upon the reserve to graze thereon. Under the facts the court properly granted an injunction. The judgment was right on the merits, wholly regardless of the question as to whether the Government had enclosed its property.

This makes it unnecessary to consider how far the United States is required to fence its property, or the other constitutional questions involved. For, as said in *Silver v. Louisville & Nashville R. R.*, 213 U. S., 23, "where cases in this court can be decided without reference to questions arising under the Federal Constitution that course it usually pursued, and is not departed from without important reasons." The decree is therefore affirmed.

SECRETARY WILSON'S COMMENT.

Secretary Wilson, after reviewing the cases said: "I feel very certain now that these questions are so definitely settled, that we shall have no further trouble in regulating the use of National Forest ranges by live stock. Indeed we have had very little for some time, because the stockmen themselves, although originally inclined to resent the interference of the Government with their long and uncontrolled use of the lands now within these forests, have, recently, accepted the situation and are rapidly realizing that their occupancy of these grazing lands is vastly more satisfactory under present conditions than it was in the old days when these areas were open to all comers and it was a constant struggle to obtain feed for their herds."

THE APPALACHIAN FORESTS

Offers of land for the new Appalachian national forests are being received at the Forest Service with encouraging rapidity. The prices range from \$1 to \$8 an acre. The Service now has nine men in the field in Georgia, four in North Carolina, and sixteen in the White Mountains, making examinations of tracts that have been offered. On the 12th of May there was introduced simultaneously in the House and Senate by Representative Weeks and Senator Gallinger a joint resolution providing that the appropriation of \$1,000,000 dollars carried by the Weeks Bill for the fiscal year ending June 30, 1910, and \$2,000,000 for the fiscal year ending June 30, 1911, shall be available for use at any time prior to June 30, 1915.

If this resolution passes the two houses it will carry out the original intent of the bill, which was to make a total amount of \$11,000,000 available for the new national forests to be expended before June 30, 1915.

There is in the state of Alabama something over 100,000 acres of public land, much of it in the mountainous counties of Northern Alabama, which it is hoped will be withdrawn from entry in accordance with the precedent established in creating the western national forests, and this will make a good nucleus for national forests in that state.

There has been so much doubt as to the attitude of the Geological Survey in relation to its share in the operation of the new forest law that a statement has been issued by the Director of the Survey, George Otis Smith, which is in substance that the responsibility of the United States

Geological Survey under the act is set forth in section 6, which provides that preceding any purchase there must be an examination of the land by the Geological Survey, with a favorable report to the Secretary of Agriculture "showing that the control of such lands will promote or protect the navigation of streams on whose watersheds they lie." In the agreement between the two departments it is set forth that the responsibility rests upon the National Forest Reservation Commission to determine what streams are navigable or "may be developed for navigable purposes" within the meaning of this act, and upon the Secretary of Agriculture to select the navigable streams to be thus protected.

The Geological Survey, however, is under the law the determinative agent whose certification is necessary to show that control of the land, the purchase of which is contemplated, has some material effect on stream flow and the protection of navigability. The report by the Geological Survey will be based upon the consideration of such questions as whether the tract possesses slope and soil and rock surface of such character that vegetative cover will check or retard runoff, and thereby secure the entrance of the water into the underground circulation; whether the topographic and geologic conditions favor serious surface erosion, in the absence of a protective cover of vegetation, of materials of such a character and contributed under such conditions as to reach the navigable portion of the stream; whether protective cover in the headwater region would prevent loss of storage capacity of reservoirs,

present or prospective, which in turn promote or protect navigation of the stream, and whether, if navigable only on its tidal basin, headwater protection from either flow fluctuation or silt contribution would promote or protect such navigability.

The field examinations of the Geological Survey will be hydrographic, geologic and topographic, and will include the determination of the relation of the headwater streams to the navigable stream to which they are tributary, to which general examination must be joined the local observation of the headwater stream or streams draining the tract in question, with reference to runoff characteristics and to nature and amount of suspended material; the classification of the surface formations of the tract, with reference to permeability and storage capacity and to resistance to erosion, and the securing of such additional topographic data in cooperation with the Forest Service as are needed by the two bureaus in their examination of the tract. All of these inquiries, however, are planned with the sole intention of enabling the Geological Survey to determine the fundamental question presented to it: "Will the control of a particular tract of land, the purchase of which by the Government is proposed, promote or protect the navigation of a particular stream?"

The geological survey's interpretation of its function in the administration of the Weeks law is that it involves a thorough investigation of the physical facts bearing upon the relation of each specific tract to the navigability of the stream on whose headwaters it lies. It is the position of the geological survey that in general forest cover does promote and protect stream flow, but with the multiplicity of widely varying factors that enter into the problem as presented in each different locality the rule cannot be given universal application. In this connection it may be noted that one of New England's foremost civil engineers in urging immediate purchase of lands in the White Mountain region mentions a difference of conditions on two parts of the drainage basin of one of the rivers under consideration, stating that the cutting of forests in the one area could not be considered as affecting navigation on the main river, but making exactly the opposite statement regarding the need of forests on the headwaters of the other tributary. Although it has been definitely reported that the geological survey has condemned at least two of the New England rivers as not being navigable streams within the meaning of the Weeks act, it is pointed out at the geological survey that such a statement contains a double error.

In the first place, the determination of what are navigable streams within the meaning of this act lies with the national forest reservation commission, and in the second place the position taken by the geological survey is that it is not warranted

in prejudging the case of any area and that either a favorable or an unfavorable report must be preceded by actual field examination to determine the essential factors in the local problem. While the survey is in possession of a large amount of data resulting from its many years of field surveys, topographic, geologic and hydrographic, there is no case thus far noted in which the officials of the survey regard the material already in hand as sufficient to constitute the showing required by the Weeks law. It is, however, the survey's purpose to obtain this needed additional information at once, and its field men are starting this week to examine areas in North Carolina and Tennessee, and at conferences in Secretary Fisher's office last week the director of the survey assured Gov. Bass of New Hampshire and Senator Gallinger and Representative Weeks that examination within the White Mountain region would be begun this spring and the investigation continued through the coming field season.

Director Smith expresses himself as altogether sympathetic with the popular demand for forest purchases, and his personal opinion in the subject of the influence of forests upon stream flow was reflected in his contribution to the discussion of the whole subject by the American Society of Civil Engineers over two years ago, but, as he adds, "The very field observations which prompted me to oppose certain generalizations of Maj. Chittenden in his forceful arguments against the existence of any relations between forest and navigation force me to acknowledge on the other hand that forests are not everywhere essential to the regulation of stream flow.

"I have taken a personal interest in the subject of forest conservation, and have always professed my strong belief in the importance of the objects to be served by forest preservation, even though these may be only incidental to the declared purpose of the Weeks act, which is to conserve navigability, and it is on this account especially that I am desirous of not only meeting the present situation wisely, but also of assisting in the future accomplishment of further enactments and appropriations, which end can be insured in my opinion only by the wise administration of the law which was approved by President Taft on March 1."

While there must be general respect for the serious view of his responsibility under the law taken by Director Smith, it may be doubted whether such exhaustive scientific examination was contemplated by Congress or is practically necessary. The question to be determined is much simpler than that. A longer term of years would be necessary to go into the investigations proposed by the Director and there is a public exigency demanding prompt action.

CURRENT LITERATURE

REVIEWS

The Principles of Handling Woodlands. By Henry Solon Graves, Chief Forester, Forest Service, U. S. Department of Agriculture. pp. xxi, 325. New York, John Wiley & Sons; London, Chapman & Hall, limited, 1911. Price \$1.50, net.

Our American literature of the theory and practice of forestry is very new and naturally increases slowly. Our foresters have been too busy establishing their profession, doing its hard work, fighting its battles, to put out many books. The United States Forest Service has issued a mass of published material, some of it of great and permanent value, much of it to meet the needs of the hour, and this has been supplemented by the publications of associations and state forest services, but the digested literature of the subject in permanent book form, covering the field of American forestry, is still limited. Nevertheless, it is steadily developing and there is cause for congratulation when any of the recognized authorities among American foresters adds to the list. It is, therefore, with distinct pleasure that we receive a book by the Chief Forester of the United States. Mr. Graves has chosen a subject that needed to be covered and one which from his wide experience with the types and conditions of American silviculture he was peculiarly well fitted to discuss. In his preface the author mentions the need which we have indicated "of systematic works covering the different branches of forestry, for the use of owners of woodlands, for practicing foresters, and students in the forest schools." The present volume is "a contribution to this greatly needed literature of forestry," "covering the silvicultural treatment of woodlands." It is made clear that this phrase covers its field, artificial seeding and planting not being treated. Its standpoint is that of present day conditions, which will be modified as better and more intensive methods come in with increasing values and larger returns from forestry. The author's own statement of his plan should be noted in this connection:

"In the long run the application of forestry in this country will resemble very

closely that in Europe, with such modifications as are required by the peculiar characteristics of our species and our climate. I have laid special emphasis on some of the more primitive methods of forestry because these are often the only methods which can be applied under conditions of poor markets and difficult logging. Thus a prominent place is given to the selection system in its first application to virgin forests; some of the clear-cutting systems, which will necessarily later be replaced by better methods, are described in considerable detail; and more space is given to the primitive application of the shelterwood system than to its fully developed practise in Europe. A number of the European modifications of the various silvicultural systems have not been mentioned at all, as they would have at present only a very limited application in this country."

The various chapters include (1) a general introduction describing American forest conditions, the object and cost of silviculture, classifications and systems; (2) the selection system; (3) systems of clear cutting; (4) the shelterwood system; (5) the coppice system; (6) improvement of the forest; (7) protection of forests from fire, a chapter which is substantially the recent bulletin on the same subject issued by the Forest Service and reprinted in *AMERICAN FORESTRY* serially last year, and (8) protection from other injurious agencies, first of which and next to fire in magnitude Mr. Graves places the various injurious forest insects. The book has an analytical table of contents and an index.

This is a volume which will be serviceable to either the lay or professional student, although primarily a professional book for professionals. It is clear and direct in style, not unnecessarily encumbered with technicalities, but exact and thorough. So far as the professional foresters are concerned it may safely be assumed that they will consider it a necessary part of their equipment; and beyond that, it may be said that no owner of woodlands or non-professional student of the subject can study it without reaching a clearer conception of the scope and principles of forestry.

Commercial Geography. By Edward Van Dyke Robinson, Professor of Economics in the University of Minnesota, former Principal of the Central High School at St. Paul. Rand, McNally and Company, Chicago and New York. pp. XVIII, 455.

In his preface the author defines commercial geography as the study of the localization of industry, the factors involved being nature, man and capital goods, there being, he says, three sets of controls, the natural, human and the economic, which jointly determine the localization of industry. He believes that the study of commercial geography can be made of real scientific educational value. The first part of the work considers the growth and factors of commerce, taking up first its beginnings, then the Mediterranean age, and passing on to consider how commerce depends on land and sea, on climate, on land, and on economic forces. Chapters follow on the development of transportation and on the principal raw materials of commerce. The second part contains chapters on the continents and countries, the final chapter dealing with world industries and the organization of commerce. Some useful statistical tables, and a good index, occupy the last pages. Forests and forestry seem to be given adequate attention. In the second chapter three pages are given to a good, compact statement of the relation of the forest and its economic importance to man and the forests appear afterward in connection with each country having forests of commercial importance. The scope of this book is elementary and necessarily brief but the facts are well and apparently accurately stated and the book fulfills its announced purpose of being suggestive and making the student think. There are numerous maps, good, though small.

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NATIONAL FOREST WORK

Forest Assistants Appointed

Examinations have recently been held by the Civil Service Commission for positions as forest assistant, and seventy-two of those who successfully passed the examination have been certified for permanent or temporary appointments and assigned to the different districts. The assignments are as follows:

District 1. Headquarters at Missoula, Montana.

Permanent—Frederick R. Mason, Howard A. Green, John F. Forsythe, Whiting Alden, Kenneth D. Swan, James C. Whitham, Louis R. Stadtmüller, Alfred B. Hastings, Henry W. de Nancrede.

Temporary—Otto Katz, Arthur F. Oppel, Waldo D. Barlow, Ernest F. Jones, Samuel R. Donnelly.

District 2. Headquarters at Denver, Colorado.

Permanent—Leigh J. Young, Fred R. Johnson, George Z. Mason, George R. Morrison, Arthur F. C. Hoffman, Myron W. Thompson, George R. Monell, Gordon Parker, W. G. Baxter.

Temporary—Huber C. Hilton, Philip L. Buttrick, Jay J. Fitz, Walter A. Hopson, Dwight S. Jeffers, Charles E. Beaumont, Devillo T. Wood.

District 3. Headquarters at Albuquerque, New Mexico.

Permanent—Albert E. Moss, Quincy Randles, John S. Boyce, H. Basil Wales, Otto F. Swenson, John F. Pernot, John W. Spencer, Ernest C. Pegg, Thomas E. McCullough.

Temporary—Irving W. Gilson, William C. Koepke, Clifford W. McKibbin, N. Curtis Case, Robert W. Shields.

District 4. Headquarters at Ogden, Utah.

Permanent—J. Warrington Stokes, Edward F. McCarthy, Edwin C. Shepard, Lee O. Miles, Edward J. Hanzlik.

Temporary—Hubert C. Williams, Arthur F. Fisher, Charles E. Edwards.

District 5. Headquarters at San Francisco, California.

Permanent—Theodore W. Dwight, Douglas K. Noyes, Edward I. Kotok, Richard H. Boerker, Jesse W. Hough, Neal T. Childs, George W. Lyon, Carl L. Hamilton.

Temporary—E. T. Bushnell, Loren L. Bishop, Howard de Forest.

District 6. Headquarters at Portland, Oregon.

Permanent—Arthur F. Karr, Abraham Rosenmond, Walter H. Leve, Frank J. Mosher, L. Wernstedt.

Temporary—Lawrence B. Pagter, Carington McFarlane, Percy T. Smith.

The new men are graduates of various forest schools. The assignments are made as far as possible on the basis of the personal wishes of the men, their suitability to certain regions, and the needs for the different districts. The permanent appointments are at \$1,200 annually, and the temporary appointments are made for three months on a basis of \$1,000 annually. The temporary appointments may be made permanent when the exigencies of the Service require.

SURFACE CONDITIONS AND STREAM FLOW

A delayed publication of the Forest Service has recently appeared—Circular 176 on Surface Conditions and Stream Flow, by William L. Hall, assistant forester, and Hu Maxwell, expert. This report was ready for publication when the chief of the Weather Bureau, Mr. Moore, brought out as a congressional document through the House Committee on Agriculture the remarkable report which was so much discussed at the time bearing on the same subject. Both reports had been held up by the Secretary of Agriculture until the position of the Department could be determined. Now the work of Mr. Hall and Mr. Maxwell is given publicity through the regular department channels.

The circular notes the popular belief that floods in many of our rivers are increasing in frequency and duration, the interest taken by scientific bureaus of the government in the question, and says that both the Forest Service and the Geological Survey have secured data warranting the statement that "unmistakably, floods are steadily on the increase in some of our most important rivers," particularly those rising in the eastern mountains and where surface conditions of the watersheds have been most changed. Specific mention is made of such streams as the Ohio, Cumberland, Wateree, and Santee, where the forest has been destroyed. Streams on which floods have decreased and low waters improved, show conditions which also seem to prove the rule "that there is the closest kind of relationship between the surface conditions of a watershed and the flow of water through the stream which drains it." A table follows giving the records of the Potomac, Monongahela, Ohio, Cumberland, Wateree, Savannah, Tennessee and Allegheny rivers for periods ranging from eight to seventeen years, showing that the high water and low water stages have been intensified in these streams without a corresponding change in precipitation. Figures for the Wabash and Red rivers show that floods have decreased during periods of eight and nine years. After a discussion of these tabulated figures, the circular notes that—

"While the record is given for only eight streams which show increased floods, it must not be understood that these are the only streams which show this tendency; rather, they are examples—particularly they are examples of streams having their source in

the Appalachian Mountains. They have been given because their records are more complete and longer than those for other streams. The records of most other streams of the region, so far as they are sufficient to show a tendency, indicate the same progressive change toward increased floods. For example, this is true of the Alabama River, of the Connecticut, of the Muskingum, and of the Congaree."

Possible causes for the conditions shown by these records are then discussed. The factors affecting streamflow, climate, topography, natural or artificial reservoirs, soil and ground cover, are each considered, climate being understood as embracing precipitation and evaporation with whatever influences them, as wind, humidity, temperature, and altitude.

It is observed that precipitation, which must modify stream flow in a vital way, has not increased over the Appalachian mountain region in any degree corresponding to the high water figures, which "show that on only two of the rivers mentioned in the table has there been any increase and there by small amount while in the other six there has been a decrease, in the case of one stream, the Tennessee, amounting to an average of six inches. The real tendency of the precipitation over these basins would therefore be to decrease flood conditions. Consequently we must conclude that the increase in flood conditions are in no degree due to precipitation."

Since more than half of the precipitation goes off through evaporation, this is an important factor in the problem and it is fundamentally influenced by temperature, air pressure, wind and humidity.

"It is during the prolonged heated periods, which are often dry periods, that evaporation has greatest influence. It undoubtedly affects as much as any other factor the low water stages of the streams, yet by its very nature it cannot much influence floods, because they rise quickly and are never of many days duration. There is not time for much water to evaporate, hence we can put aside this climatic influence just as in this case we have put aside precipitation. We must look elsewhere for the cause."

"Temperature, while influencing stream flow indirectly, through evaporation, also influences it directly. For example the upper watershed of the Monongahela River, in West Virginia, may be considered:

It is February, and there have been several weeks of cold weather; the ground, which is bare of snow, is frozen solid. There comes a heavy fall of snow, or perhaps several, bringing the snow cover to a depth of 12 to 18 inches. Within a few days the weather moderates and a prolonged rainy period follows. The first rain is caught by the snow and little escapes. But as it continues to come, it melts the snow so that the water from the snowfall and the rainfall is concentrated upon the surface at one time. If the ground were not frozen, much of it could be absorbed and distributed downward, but in the case we have assumed the earth is frozen solid, so that no water, or at least but little, can be absorbed. The whole volume is liberated on the surface and races away from the smaller streams to the larger, and at last, gathering in immense quantity, it overtaxes the channel of the main river and inundates the entire valley. It is this condition of rain, snow, and temperature operating together which brings about some of the greatest floods. A flood resulting from such a cause is not likely to occur more than once a year in any stream, and several years may pass without flood on a given watershed from this combination of causes. It can not be said that floods from this cause show any progressive change, and consequently we can not ascribe to this cause the increased flood conditions in the rivers now under consideration.

TOPOGRAPHY AND GEOLOGY

A region's topography largely influences its run-off. Steep slopes and sharp ridges shed water quickly. A flat surface causes it to flow away more slowly.

Likewise, geology has a great deal to do with the drainage of any region. When rain has fallen and has passed through the soil cover and the soil it comes in contact with the rocks which lie beneath. In obedience to gravity it will penetrate as deeply as possible. Considering the depth to which it can go and the quantity in which it can be stored, the earth forms a great storage reservoir which tends on most watersheds to have a strong influence toward steadiness in the flow of streams. While topography and geology are important factors in considering the amount and character of run-off when one stream is compared with another, they are of no consequence when one is considering the condition in the same stream during two different periods, because they are subject to no appreciable variation. Both the topography and the geology of any given stream may be said to be constant, and so are not of importance in considering what has caused a changed condition of flow in any particular stream."

The effect of natural and artificial reservoirs, which gather and hold immense volumes of water, such as are found on some

river systems, notably the Merrimac in New England, is noted. And on this point the circular says:

"If at the headwaters of the rivers under consideration in this paper there had been great lakes or swamps which had been drained during the period under consideration, it might well be said that the influence of that action would be sufficient to cause a difference in the run-off of the streams. But, except in the case of the Wabash, there have been no changes of this character. There are on these streams no important natural lakes, and no reservoirs of great extent have been developed. Consequently, this factor also is insignificant."

Soil and ground cover are next discussed as follows: "Though the topography and geology of a watershed change too slowly to be readily observed, there are other factors in which changes may be rapid, radical, and of great importance. One such factor is soil. The soil, when considered as a factor in controlling run-off, is a complicated and delicate apparatus. It works admirably when in good condition, but it is easily deranged and is liable to severe and fundamental injury, by which its action on storm water may be lessened or almost entirely destroyed. Mistreatment frequently produces results of a serious nature in the drainage of a watershed.

"The mineral soil is composed of disintegrating rock that has broken down by the slow process of weathering. Deep mineral soils, if they have not accumulated from transported materials, represent a long period of rest, during which the surface has been free from erosion, while the disintegrating rock beneath has added little by little to the depth. Upon the mineral base, and more or less mixed with it, is the humus, which owes its existence to organic matter mostly vegetable, which has decayed and added the accumulated remnants to the mineral soil. Humus vastly increases a soil's capacity to absorb and store water.

"The important work which soil performs in regulating the run-off for a region is easily understood. If the soil is present in sufficient quantity and good condition, that is, is porous and well supplied with humus, it readily absorbs storm water at the surface and passes it on downward through the underlying rocks and strata. Although these rocks themselves change but little, their storage of water is regulated by the soil and varies with its changes. If the soil is hardened or removed, the amount of water which can be taken in is correspondingly reduced and the amount which is thrown off over the surface into the streams correspondingly increased. A watershed without soil or with a soil which does not readily perform its normal functions, results in erratic streams, which are usually agents of destruction rather than of use. The consid-

eration of the flow of any stream should therefore take particular note of the soil and of the changes in its capacity for water storage.

"Scarcely separable from the soil itself is another factor of equal or greater importance in the disposition of water. This is the ground cover, or, to speak of it more particularly, the condition of the surface of the ground; that is, whether it is barren rock or clay, pasture land, cultivated land, or forest.

The condition of the surface does not influence very much, so far as known, the amount of water which falls. It is claimed by some that the precipitation is greater in the forest than on unforested land, and the figures given in the table at the beginning of this paper seem to indicate a tendency toward lessened precipitation on those watersheds which will presently be shown as having a decreased forest area. However, it is not intended at present to lay any stress upon that point. If the influence of the various factors which affect stream flow have been correctly stated, none of them is sufficient to have caused the increased floods. The natural conclusion is that the increase must be due to changes in the ground cover, or to the ground cover in conjunction with changes in the soil. Is the influence of the ground cover and of the soil sufficient to have caused the results?

"It is generally agreed by those who have studied the subject most thoroughly that the forest offers the best conditions for absorption and underground storage. Next to the forest comes well-cultivated farm land; then meadow and pasture land; while the worst conditions of all are to be found on barren surfaces of stone, clay, or gravel, which because of inferiority are unable to support growth of any kind.

"The reasons why the forest offers the best conditions for absorption and ground storage are several. It does so, in the first place, because the foliage of the trees forms a storage place from which water drips slowly to the ground for a considerable length of time after each rain; because the complex layer of brush, leaves, weeds, mosses, and vines, all in a more or less advanced stage of decay, becomes filled with moisture with each heavy rain and holds it for a considerable time; because, also, the surplus water so stored continues to be absorbed by the upper humus-filled layers of earth; because, further, the temperature is lower and the air more humid in the forest than in the open; finally, because the snow lies there much longer. To these reasons must be added the mechanical power of the roots to go deep into the soil and break up the rocks, thus forming channels for the ready entrance of water into the earth.

"On a level or slightly inclined surface a well-tilled soil may be as effective in ab-

sorbing and holding water as a forest soil. Where the slope exceeds 10 per cent, cultivation does not long go on before erosion sets in, and erosion if unchecked will remove the soil and gully the surface until all fertility has gone and all protective power is lost. Agriculture under right conditions may be an effective means of stream protection; under wrong conditions it may be the greatest menace to the even flow and usefulness of the streams."

From this point we give the language of the circular in full.

THE PRINCIPAL CAUSES OF INCREASED FLOODS

"Undoubtedly it is the clearing away of the forest on the mountainous watersheds of the streams which have been described that has caused the great increase in frequency and duration of floods.

"It is a known fact that the forests on these several watersheds have been cut away with great rapidity during the past thirty years. European conditions probably offer no parallel to the rate at which these watersheds have been cleared to make way for the rapid advance of agriculture and to supply the great manufacturing industries with the wood which they require. Forest lands, which offer the best possible conditions for soil absorption and underground storage, those great regulators of stream flow, have been changed to poorly tilled agricultural lands, which are not so good. Then these agricultural lands after a few years have been exhausted and their soil eroded into deep gullies. Finally, many of them have been turned into pasture or even entirely abandoned because they reached a condition where they could not support even a growth of grass and weeds. The best condition has been changed to the very worst condition.

"Again, repeated burning of forest lands has tended to reduce the thickness and value of the ground cover and to lessen the power of the soil to absorb and to store water. The extent of damage from fire, so far as water storage is concerned, is generally vastly underestimated. A forest fire strikes both above and below the surface. It injures or kills the trees, destroys the undergrowth and brush, and consumes the great forest sponge—the ground cover and the humus. The extent of the injury is, of course, not always the same. It is sometimes slight; sometimes very great. Repeated fires tend to every kind of injury that can possibly be inflicted upon a forest soil, completely destroying the cover down to the mineral substances, and thus rendering it defenseless against the attacks of erosion. When that stage is reached, it may be depended upon that the run-off of the watershed has been profoundly affected and the regimen of the stream materially changed. The fact that forest fires have repeatedly swept over the watersheds of the streams under consideration

makes it easy to believe that this factor, combined with the clearing away of the forest for agricultural purposes, has been the chief cause of the intensified flood conditions which the records now disclose.

"Considering the streams which drain the mountain regions, the most vital parts of the watersheds are the highest parts. It is there that precipitation is the heaviest, slopes the steepest, and the whole sum of conditions most influential. Therefore, so far as stream flow is concerned, the mountains are the portion which should be given the most judicious care. It is on the mountains that the best condition of soil and ground cover should be maintained. As the best ground cover, as has already been explained, is the forest, it is to the benefit of the streams that the mountains should be kept densely forested, in order that the conditions for the absorption and retention of moisture may be as nearly as possible ideal. Under such conditions the course of the moisture will be one of continual interference from the time it reaches the crowns of the trees till it is in the stream. Every obstruction that can be placed in the way of the water aids by that much the even flow of the rivers. Under perfect forest conditions it is well-nigh impossible for any surface run-off to take place. The rain first comes into contact with the crowns of the trees, and the drops are broken more or less into spray. Some of the intercepted water runs down the trunks or drips from the branches. That which escapes interception by the trees encounters the undergrowth and brush immediately above the ground and is intercepted and retarded. As the water continues to make its way downward the ground litter offers the next obstacle. The water is caught up by the litter, and not until this has become saturated can the water pass on. If the rain continues for some time the litter becomes filled to its capacity, and then the humus begins to absorb the water which the litter can not hold. After a time it, too, becomes saturated. The water then gradually filters into and through the underlying soil. If this is deep it stores waters in large quantity and then allows the surplus to pass to still greater depths, where it finally penetrates the rock strata and replenishes the great underground reservoir, from which it emerges later as springs, some of which may be far removed, even on the opposite side of the mountain, from the place where it has come in contact with the ground. If the precipitation is in the form of snow its course is substantially the same, but with a still greater delay in passing through the litter and entering the soil. The period that may elapse between the fall of rain and the appearance of water in a river varies from minutes to months or even years.

"Even with the best regulated system of

checking and storing the rainfall a condition may arise where, to a large extent, the effect of obstruction and storage in a forest may temporarily be lost. Severe and prolonged freezing may result in a sheet of ice in and over the upper soil, which prevents the entrance of water, and whatever falls in the form of rain must at once run off into the streams. Many rivers experience their worst floods when their drainage basins are frozen. On account of this condition it is impossible to claim that extreme floods will not come in a stream with a forested watershed. Fortunately the condition arises but seldom.

"In such cases the conditions are similar to what they would be were the covering of the soil removed. The disastrous floods which come once or twice in a generation when heavy rains descend upon snow and frozen ground would probably be duplicated or surpassed yearly, or several times a year, were the soil stripped from the mountain regions. The heavy rains of summer which now fall upon a dense vegetation and hardly affect the larger rivers would then produce destructive floods.

The table on a preceding page gives data regarding the flow of 10 important rivers of the United States. It has not been possible to obtain for each watershed a record of the changes which are believed to be responsible for the increased flood conditions which the record shows. It has been possible to make a detailed study of parts of the watersheds of two of the streams, the Cumberland and the Red.

A Watershed Where Conditions Have Grown Worse

"The Cumberland River is a good example of how conditions have changed for the worse on some of these watersheds.

"The drainage area of the Cumberland River above Burnside, Ky., comprises 3,739 square miles and lies in the heart of the Cumberland Mountains. The figures given in the table show that floods have increased in the Cumberland River at Burnside, Ky., in number from 32 in the first half to 43 in the second half, and in duration from 89 days in the first half to 102 days in the second half, while low waters have increased in times from 61 in the first half to 65 in the second half, and in days from 1.261 in the first half to 1.576 in the second half.

"The removal of the forest on this watershed is progressing from three causes: (1) Clearing for agriculture; (2) lumber operations; (3) fires.

"In 1890, when these measurements were begun, 21 per cent of the watershed above Burnside was cleared; in 1908 the cleared area had grown to 32 per cent. During the eight years 1900 to 1908 clearing of forest for agricultural purposes went on on this watershed at the average rate of five-eighths of 1 per cent per year.

"The total stand of timber on this part of the Cumberland watershed is 6,212,531,000 board feet. It is being cut away by lumbering alone at the rate of 4 per cent a year. These figures show that timber is disappearing on account of lumber operations eight times as fast as it is removed to clear land for farming purposes. In other words, supposing that lumbermen would cut clear as they go, 8 acres would be stripped for timber to 1 cleared for agriculture. The forest is not being cut clear. Instead, the lumberman is going over it time after time, picking out the particular kinds or classes of timber that he wants. First, he took the walnut and cherry; next, the white oak and poplar; now he is taking the chestnut and other kinds of oak. At the present time few tracts can be found from which one or more of the valuable timbers have not been culled. Other tracts have been stripped of nearly their entire growth.

"At intervals of from one to five or six years fires run through the woods on the hills and mountains where the Cumberland River has its source. The fires are more frequent and destructive in districts where part of the timber has been cut and the refuse left on the ground. The dry ridges burn oftener than the coves, because the latter are sometimes too damp for burning. In times of prolonged drought, however, fires run through the ravines and coves where the densest growth is found. The fires are usually slow, and the damage to mature timber is not great, but the injury to the young growth is frequently excessive, and soil damage is serious. As a rule all seedlings and sprouts less than four or five feet high are killed, and, since fires come at intervals so frequent that the young growth can not attain a size above that, a large part of what would be the future forest, as well as the present ground cover, is destroyed. The surviving stand thus becomes thinner year by year, since it can not be replenished by young growth, and since the mature trees are steadily falling by natural decay or by the ax.

"Though the fires are slow and small, they burn the leaf cover and the upper layers of humus at each visitation. This removes or injures the porous surface, one of whose essential functions is to arrest the storm water falling upon the slopes and afford it an opportunity to sink into the ground. With the packing of the surface, after the litter and humus have been burned away, the water flows down the slopes and quickly reaches the streams, where, if in sufficient quantity, it produces flood conditions. Low water follows, because the hard ground is able to take in but little of the storm water to be paid out slowly afterward.

"The behavior of the Cumberland River shows a direct and positive relation between the run-off and the changed condi-

tion of the surface. The changes due to agriculture and lumbering can be definitely stated, but the extent and effect of forest fires are not subject to exact calculation. Yet undoubtedly all of these influences are active in producing the results as shown in the flood and low water records at Burnside. It is impossible that these results should be due to rainfall, because the rainfall was approximately 10 per cent less in the second half of the period. Since no other influences could have produced the result, there is no conclusion possible other than that the progressive floods and low waters have been due to the changes accomplished on the surface of the watershed.

A Watershed Where Conditions Have Grown Better

"The fact that man by his operations may decidedly change the regimen of a river is shown not alone by those streams whose flow has been influenced by clearing away the forest. It is shown, on the other hand, by streams whose watersheds of prairie soil compacted for ages by the trampling of buffalo, and more recently by cattle of the great ranches of the West, have been to a large extent brought under cultivation.

"A stream which shows this tendency in an unmistakable way is the Red River, which forms the boundary for many miles between Texas and Oklahoma. On this stream records of flow are available for sixteen years. The number of floods in the first half of this period was 19; in the second half, 16. The number of days of flood in the first half was 87; in the second half, 60. Considering also the low-water periods of this river, we find that in the first half of the period there were 49 periods of low water; in the second half there were 8. In the first half the duration of low water was 826 days; in the second half, 208 days. A falling off in the rainfall occurred on this watershed, there being 1.94 inches less water per year in the second than in the first. Its drainage basin is, and has been during the time of its known history, practically without forests, only 1 acre in 10 being forested. In that respect it differs from all eastern and many western rivers whose basins are more extensively forest covered.

"Why has the Red River constantly changed its flow toward steadiness and uniformity, while many other rivers have changed in exactly the opposite direction? The area of the Red River drainage basin above Arthur City, Tex., where the records were made, is 40,200 square miles, divided almost equally between Oklahoma and Texas. In this river, as in those before mentioned, the geology and topography have not changed. The precipitation has changed considerably in the direction of lessened rainfall, but not enough to ac-

count for the record. In soil conditions, and especially in the condition of the surface, however, the change has been marked. At the beginning of the period of measurement, in 1890, the country was for the most part occupied by large ranches. The native prairie sod had never been broken up.

"On the part of the watershed lying in Texas there had been some settlement at an early date, but as late as 1900 no more than 12 per cent of the Texas part of the watershed had been improved. In the Oklahoma part of the basin, in the same year, the improved portion was 16 per cent. Development began most extensively about 1900. In southwestern Oklahoma, in that portion drained by the Red River, it was stimulated by the opening of Indian reservations to settlement. The Cheyenne, the Arapahoe, and the Wichita lands were opened, it is true, in 1890, but the real opening of the country to settlers came in 1901, when the Comanche, the Apache, and other Indian lands were opened, aggregating over 10,000 square miles, or more than one-fourth of the entire Red River basin above Arthur City. Another tract of over 8,000 square miles, the Choctaw and Chickasaw lands, began its development about the same time. A summary of these figures shows that in 1908 the Red River basin in Oklahoma had 10,200 square miles of improved land, instead of 3,284 square miles in 1900. Statistics are not complete for the Texas portion of this basin but the Texas portion has developed at about the same rate as the Oklahoma part. It is probable that the whole Red River basin above Arthur City, in Texas and Oklahoma, had 40 per cent of its land under improvement in 1908, instead of 14 per cent eight years earlier.

"The results which have appeared in the form of change of the flow in the Red

River are precisely what ought to be expected from the changes in surface conditions. Theoretically, such results should appear, and as a matter of fact, they have appeared. The hardened prairie soil has been broken up and changed into cultivated fields over 40 per cent of the area, and thereby the absorptive capacity of the soil has been much increased. Over the remainder prairie fires have been kept out and better growth of grass secured. The extensions of cultivation and the improvement of the grass land has tended to equalize the flow of this river. The river's behavior has become better as the area of wild land has decreased. In other words, wild, barren land, being the worst condition for the protection of a watershed, and cultivated farm lands being next to forests the best condition, the change of a large part of the watershed from the worst condition to the next to the best condition has brought about this result.

"The same law is thus seen to work on both the Cumberland and the Red River watersheds, but in different directions: On the Cumberland, as the watershed changes from the forest (the best condition for stream protection) to farm land, to pasture land, and even to barren condition (the very worst condition for absorption), the flow of the river is made more extreme, both as to floods and low waters. On the Red River watershed, beginning with a wild, almost barren, compacted surface, cultivation has changed the condition to that of permeable farm lands, which, next to forests, offer the best conditions. These two extremes exemplify, therefore, in different directions, the working of the same law—that there is a vital relation between the condition of the surface of the watershed and the manner of flow of the stream which drains it."

NEWS AND NOTES

Forestry Meeting at Bretton Woods

The Society for the Protection of New Hampshire Forests will hold its annual meeting this summer at Bretton Woods on the 2nd and 3rd of August. The headquarters will be at the Mount Pleasant Hotel, where a special rate of three dollars and a half a day has been given for those who attend the meeting. President Taft has been invited to be present and may do so. The National Forest Reservation Commission, appointed under the new forest law, has also been invited to hold a meeting at the same time and place. The Directors of the American Forestry Association are contemplating holding a summer

meeting at the same time and may arrange for a field meeting of the Association conjointly with the New Hampshire Society. Those who have experienced the pleasure of a stay in the heart of the White Mountains will appreciate the attraction which this meeting offers.

Minnesota State Forest Service

The State Forestry Board under the new forestry law which was published in AMERICAN FORESTRY last month, has appointed William T. Cox, assistant forester, United States Forest Service, chief forester, and D. P. Tierney assistant.

Mr. Cox is a native of Minnesota where

he was born near Glenwood in 1878. He spent his boyhood on a farm, attended a district school and graduated from the Glenwood High School. He studied telegraphy and for a year and a half was employed as agent and operator on the "Soo Line." Subsequently he taught school for three terms. In the summer of 1901 he entered the Bureau of Forestry as student assistant, being assigned to duty on the Big Horn Forest Reserve, Wyoming. In the fall of 1901 he resigned to enter the University of Minnesota, but in 1902 he assisted, as a member of a Bureau party, in the study of drifting sands along the Columbia River, to determine their source and to devise methods of controlling them. That autumn he investigated the extent and damage of the big forest fires which occurred during that season in western Washington and Oregon, preparing maps of the burned areas. His report was published in "Forestry and Irrigation" and the estimates given of timber destroyed have been verified since by later figures of lumbermen in that region. After spending a portion of the winter of 1902-3 in the office at Washington, he was assigned to the study of forest fires in the South. In the summer of 1903 he examined lands for proposed forest reserves in Oregon and Washington, continuing this work in 1904 in Idaho. During the winter of 1904 he resumed his studies in the University of Minnesota, completing the technical training offered in forestry. In the spring of 1905 Mr. Cox passed the Civil Service examination for forest assistant, a position to which he was appointed the following July. On August 1 he was assigned to assist in the office of the Forester, giving special attention to reserve boundary work and miscellaneous correspondence. Mr. Cox has been regarded as one of the most proficient men in the Service and will be a most competent administrator of the excellent new forest law which Minnesota has adopted to protect one of its largest interests. He has already taken up his new position.

General C. C. Andrews, formerly State Forestry Commissioner, to whom forestry in Minnesota and in the United States owes so much, is the secretary of the new forestry board.

Oregon's New Forest Law

The state forester has issued a digest of the new forest law of the state as follows:

Any and all inadequately protected forest or cut-over land adjoining, lying near or intermingling with other forest land and covered wholly or in part by inflammable debris or otherwise likely to further the spread of fire, which, by reason of such location or condition or lack of protection, endangers life or property, is declared a public nuisance, and whenever the state forester shall learn thereof

he shall notify the owners or persons in control or possession of said land, requesting them to take proper steps for its protection and advising them of means and methods to that end.

Fire Wardens to Enforce Law

All fire wardens, under instructions from the state forester, shall take proper steps for the prevention and extinguishment of fires within their localities, assist in apprehending and convicting offenders against fire laws, control the use of fire for clearing land in the closed season, and make such reports as may be requested by the state forester. They have power to make arrests for violation of forest laws and to enter upon the lands of any person or owner in the discharge of their duties; provided, that in so entering they exercise due care to avoid doing damage. Any fire warden who has information which would show with reasonable certainty that any person has violated the forest laws, shall immediately take action against the offender by arresting or making complaint to the proper magistrate or by filing information with the district attorney, and shall obtain all possible evidence. Wardens are punishable by both fine and imprisonment for failure to comply with their duties.

Closed Season for Burning

Burning of slashing, chopping, woodland or brushland is unlawful between June 1 and October 1, without written or printed permission from a fire warden and strict compliance with terms of the permit which shall give condition to be observed. This restriction does not apply to burning of log piles, stumps or brush heaps in small quantities, under ample precaution and personal control, and in accordance with any regulations of the state board of forestry. If any burning without permission results in the escape of fire or injury to another, such escape and injury shall be proof that the burning was in violation of the law. Violations of this provision are punishable by \$25 to \$500 fine or ten days to three months' imprisonment. Any fire warden may revoke or postpone permits when necessary to prevent danger to life and property. Any permit obtained through wilful misrepresentation is invalid and no defense from penalties of the law.

Governor May Suspend Permits

In times and localities of unusual fire danger the governor, with the advice of the state forester, may suspend any or all permits or privileges and prohibit absolutely the use of fire herein mentioned. He may, in certain emergencies, suspend the open season for shooting game, by proclamation, and for such time as he may designate, during which all laws of closed season shall be in force.

In times or localities of particular fire danger, or to enforce the fire laws or apprehend and prosecute violators thereof, the state forester may appoint or employ, independently or jointly with other agencies, such additional fire wardens, and to furnish these such assistance and facilities for protecting life or property from fire as he shall deem public safety demands, and unless contributed to by other sources, the cost thereof shall be paid from the funds appropriated by this act, but each county in which such service is given shall be responsible for one third the expense thus actually incurred and paid by the state for services within said county, and upon demand by the state treasurer shall pay the amount thus due the state treasury to be credited to the fund appropriated by this act.

Setting fires or causing fires to be set on land of another without permission of the owner; wilfully or negligently allowing fire to escape from a man's own land; accidentally setting fire on land of his own or of another and allowing it to escape without using every effort to extinguish it, are punishable by \$50 to \$100 fine or one month to one year imprisonment.

Camp Fires Permitted—When

Camp fires may be built in a careful manner on uninclosed land if same is not forbidden by personal or posted notice of the owner, but fire must be totally extinguished by the builder before departing. Ground around camp fires must be cleared of all material which will carry fire, and fires must not be left burning or unattended or permitted to spread on land of another, under penalty of fine or imprisonment.

Back fires are permitted if set in good faith to prevent the progress of fire already burning.

The use of inflammable gun wadding in firearms discharged on land of another is punishable by fine or imprisonment.

Spark Arresters on Engines

Adequate spark arresters must be kept in constant use and repair during the closed season—June 1 to October 1—on all locomotives, logging engines, portable engines, traction or stationary engines using fuel other than oil in or near forest or brush land under penalty of \$25 to \$100. Escape of fire from any such engine is proof of violation of law, and each engine not equipped with required spark arrester is deemed a separate offense.

All annual slashings by those engaged in logging or permitting logging on their lands must be burned each year and the fire confined to the lands of those doing the burning. If burned between June 1 and October 1 all dead trees or snags over 25 feet high must be cut down. Such burning is also subject to the provision of section 8. Penalties are \$100 to \$1,000.

State forester may suspend these restrictions where public safety permits or requires, but may have such burning done at the expense of the offender who fails to comply with the law after proper notice.

Keeping Out Debris

All inflammable material resulting from clearing or construction of trails, roads and railroads must be immediately destroyed or removed unless prevented under the provisions of section 8. Those operating railroads with coal or wood fuel shall annually, or when directed by the state board of forestry, destroy or remove all inflammable material from their rights of way, in accordance with the directions of said board.

Setting fire unlawfully with intent to injure property of another is deemed a felony and is punishable by one to ten years in the penitentiary.

In addition to the penalties of this law, damages may be recovered, in civil action, brought by persons whose property has been injured or destroyed, against those responsible, to the extent of double the amount of damages if fire occurs through wilfulness, malice or negligence. But if fire was accidental or unavoidable action shall lie only for actual damage.

Persons or corporations causing fire in violation of this law are liable for the full amount of all expense incurred in fighting such fires.

Reward for Information

One half of the fine paid by any one convicted of violating this law will be paid to any person, not employed and compensated as a fire warden, who furnishes information leading to the arrest and conviction.

All fines imposed under this law, less cost of collection and information, shall go to the county in which conviction is had.

District Attorney to Prosecute

The district attorney must prosecute with all diligence and energy whenever an arrest is made for violation of this law within his district, or whenever an evidence is lodged with him showing with reasonable certainty any such violation. Failure of the district attorney to act is punishable by \$100 to \$1,000 fine. The same penalty applies to justices of the peace who refuse or neglect to issue warrants for the arrest of persons when complaint under oath has been lodged with them.

Wilful destruction of any notice posted in compliance with this law is punishable by \$10 to \$50 fine or imprisonment one day for each \$2 thereof.

Boards of county commissioners may appropriate money for forest protection under the provisions of this law, and expenses so incurred shall be a proper county charge.

Forest protection, not
stream-gauging, is the
immediate need of the White
Mountain-Southern Appa-
lachian rivers.



LOOKING UP THE VALLEY OF CANE CREEK FROM BAKERSVILLE, NORTH CAROLINA, SHOWING ERODED ALLUVIAL LANDS. THE CREEK FORMERLY RAN AT THE BASE OF THE HILL ON THE RIGHT. ITS COURSE IS NOW DISTRIBUTED IN SMALL CHANNELS, EXTENDING OVER A BREADTH OF MORE THAN 100 YARDS. SEVERAL HOUSES ARE WASHED AWAY, AND THE THREE HOUSES IN SIGHT WERE UNDERMINED AND TURNED ON THEIR FOUNDATIONS BY THE FRESHET OF MAY, 1901.

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ON JUNE 19th, the National Forest Reservation Commission met at the request of the Forest Service to consider the tracts which the Forest Service had examined and passed on with approval. There were present at the meeting Secretary of Agriculture Wilson, Secretary of the Interior Fisher, Secretary of War Stimson, Senator Smith of Maryland (Senator Gallinger was the only member of the Commission not present), Representative Hawley of Oregon, Representative Gordon Lee of Georgia, Director Smith of the Geological Survey, Mr. Graves, the Forester, and Mr. William L. Hall. The Commission took no action, for the members felt that with the two tracts which both the Survey and the Forest Service had examined, certain legal questions must be settled once for all, and in the words of the Commission, that "we must start right."

The Forest Service had made surveys and had all necessary data on nine or ten tracts, three of which were in the White Mountains, and the rest in the Southern Appalachians. These tracts involved 140,000 acres. But the Geological Survey had examined and approved only two tracts, Tract A in Georgia, of some thirty thousand acres, and Tract B in Tennessee, of some sixty thousand acres. These two tracts involve legal questions as to title and conditions, for most of the titles in mountain regions of the South are what are known as "shot-gun" titles, and there is much uncertainty and a great deal of difficulty where the settler has taken possession and has tried to farm on non-agricultural forest lands with obscure titles.

On the other eight tracts more easily accessible and with no legal questions involved, which the Forest Service had approved, the Geological Survey was not ready with its report. Director Smith does not seem able to coöperate with the Forest Service in the way prescribed by law. His attitude is in marked contrast to that of the Commission, which met on the first day appointed by the Service, and gave to the consideration of its plans the most cordial and enthusiastic attention. The Commission will carry out the wishes of the people, as expressed in the law of March 4, 1911. But it may as well be recognized now as later that the ambiguity in the law's expression as to the amount of coöperation of the Geological Survey is going to be used by the men who are consistently and continuously opposed to the public-spirited labors of the Forest Service.

In the consideration of lands recommended for purchase by the Forest Service and approved by the Geological Survey, the National Forest Reservation Commission encountered certain points which seem to require further consideration.

In the case of one tract, Tract A, the mineral rights had been reserved not by the present owners, but by former owners, and apparently the reservations were made and appear to be entirely without restrictions as to how the mining is to be carried on or the minerals removed. In such a case it would be apparently impossible to adequately protect the forest. Should the government purchase the land the Weeks law specifically provides that in every case the rules and regulations under which the mining and removal of such minerals shall be done shall be expressed in the instrument of conveyance and thereafter the mining and removal of the minerals so reserved shall be done only under and in obedience to the rules and regulations so expressed. Of course, it is impossible to apply the provisions of the law regarding these restrictions where the reservations were made years ago and are simply carried over in the present deeds. It seemed to the Commission that the effect of such reservation should be reported upon by the Attorney General before any action should be taken.

In another case Tract B, where it was proposed to purchase the land, with the timber standing thereon reserved to the owner under a contract to run 20 years or more, the question arose as to the specific agreement to be entered into with the company for the cutting of this timber and for the protection of the land and young growth against fire.

All these matters called for further investigation and for negotiations. Until this can be done the Commission may not think it best to take any action. This should not, however, take very long.

Representatives Hawley and Gordon Lee, accompanied by Mr. William W. Ashe, of the Forest Service, after the meeting on June 19th, made a trip to Georgia especially to investigate the deeds and titles involved in that tract. They will make their report to the Commission after this magazine goes to press, for the Commission is to meet again on Monday, the 26th of June, to see if any action to use any portion of the two million dollars' appropriation to purchase any lands approved both by the Forest Service and the Geological Survey can be taken before the end of the fiscal year.

When it became evident because of the delay of Director Smith that only a very small part of this two million dollars could be used before the end of this fiscal year, three resolutions were introduced into Congress—one by Representative Austin of Tennessee, one by Representative Weeks of Massachusetts, and one by Senator Gallinger of New Hampshire—providing that the unused portion of the appropriation remaining in the Treasury of the United States should be placed to the credit of the National Forest Reservation Commission for use within the ten years of its official existence. This session of Congress is, of course, not concerned with appropriation bills and the Democratic caucus has ordered that no bills involving appropriations should be reported out of committee this session. The fate of these three bills is evident. Whether or not the next Congress will take the desired action remains to be seen.

Within the short time between the passage of the Weeks bill in February and the end of the fiscal year in June, every effort has been made by the Forest Service to proceed with the acquisition of lands. A very efficient organization was ready for action as soon as the bill became law and has done its part. All the men possible were put into the field to make surveys and examinations. They worked night and day with their characteristic zeal to carry out the letter and spirit of the law. The same cannot be said of the Geological Survey, which has apparently regarded itself as clothed by the law with power without obligation.

Summed up, the situation is as follows: It is very doubtful if the Georgia tract and the Tennessee tract together comprising 90,000 acres and approved

both by the Forest Service and the Geological Survey, can be purchased before the end of the fiscal year, although two members of the Commission are personally examining them and the Commission voted to meet the 26th day of June before the close of the fiscal year.

Were it possible to buy the two tracts named above, only a very small portion of the two million dollars could be used. The remainder of that appropriation, so far as this Congress is concerned, is lost to the Commission. The next Congress may vote to make the unused portion in the Treasury payable to the Commission at some future time.

The purpose of the Weeks bill, which became a law March 4, 1911, has been frustrated. The Director of the Geological Survey may find himself in the disagreeable position of having to answer to the people of the country for what he has failed to do and what he has prevented others from doing.

COOPERATION WITH STATES IN FIRE PATROL

By J. G. PETERS,

CHIEF OF STATE COOPERATION, UNITED STATES FOREST SERVICE.

THE first tangible results of the Weeks law came on June second, when the Secretary of Agriculture and the president of the New Hampshire Forestry Commission placed their signatures to a coöperative agreement for protecting the forests of the state from fire. The Secretary's representative in putting this agreement into effect is the Forest Service.

The section of the Weeks law, which authorizes such coöperation, carries an appropriation of \$200,000 to enable the Secretary of Agriculture to coöperate with the states in protecting from fire the forested watersheds of navigable streams. The Secretary is authorized to coöperate in the organization and maintenance of a system of fire protection on private or state forest lands situated upon such watersheds. The states in order to receive federal assistance of this sort must have provided by law for a system of forest fire protection, and must have appropriated funds for the system. The federal government can not expend in any state an amount to exceed that expended by the state.

New Hampshire, among other states, requested coöperation under this section of the Weeks law. The state had fulfilled all the requirements of the law. It had a system of forest fire protection; it had made an appropriation for such protection; and it proposed to expend an amount equal at least to that requested of the federal government for protection on the forested watersheds of its navigable streams. The state requested a federal allotment of \$7,700. It was approved for \$7,200. This amount will provide the services of 24 forest patrolmen at \$2 a day from June 1 to October 31. The state, on its part, will expend at least this much, perhaps twice as much, in the salaries of patrolmen, the construction and maintenance of lookout stations and telephone lines, the fighting of forest fires and the like. Although the expenditures of the state, which are to offset those of the federal government, may properly be for various purposes of protection, the expenditures of the federal government are to be exclusively for the employment of patrolmen, including men assigned to lookout duty, railroad patrol, and so on. This is advisable in order to simplify the fiscal operation of the coöperative agreement

and also the inspection of the use of government funds and the results accomplished thereby, which it may be desirable for the Forest Service to make from time to time. A distinction has also been made between state patrolmen and federal patrolmen, which will facilitate keeping separate the work charged to the state and that charged to the federal government.

The State Forester of New Hampshire, acting as the representative of the State Forestry Commission, has a Forest Service appointment which will permit him to employ federal patrolmen and certify to their services on Forest Service payrolls. The state forester is given as much authority and latitude as possible in the expenditure of federal funds, in the belief that he should be placed in practically the same position as the national forest supervisors, by allowing him a wide degree of discretion while at the same time making him fully accountable for results. He selects the federal patrolmen, subject to Forest Service approval, instructs them as to their duties, and supervises their work. He has supplied the Service, at its request, with a comprehensive fire plan, including maps showing the areas to be protected, the headquarters and approximate routes of the federal patrolmen, and all features necessary to a clear understanding of the state's plan of fire control.

The federal patrolmen are to have such police powers for the prevention and control of forest fires as the laws of New Hampshire provide; they are authorized to employ assistance in fighting fires; and they are to be equipped with fire fighting tools.

The Forest Service will inspect the coöperative work on the protected areas, and it is authorized to withdraw its approval of any such area or terminate the employment of the state forester or of any federal patrolman.

The coöperation will, I believe, result in great benefit to New Hampshire, and the federal government is glad to help a state that has done so much, although just recently, in providing its forests with protection from fire. Similar work will be done in other states. Maine, Vermont, Massachusetts, Connecticut, New Jersey, Maryland, Wisconsin, and Minnesota have requested federal coöperation in forest fire protection. Agreements with Maine, New Jersey and Wisconsin are before the Department and it is probable that before July 1 they will have been signed by the Secretary of Agriculture. During the present season not more than \$10,000 will be expended in any one state. The Forest Service has taken the view that this sort of coöperation, being entirely new to it, should be conducted on a restricted scale until the best methods have been determined by experience, and that it should use the funds available for the purpose to encourage local effort in as many different states as possible. I am exceedingly enthusiastic over this work and the opportunity given for the most practical kind of coöperation with the states. I look upon it as the beginning of a great work in protecting the forests of the country from fire, especially those of the eastern states. I feel confident that the early results of this coöperation will encourage states which have no forest fire protective systems to provide for them and make adequate appropriations, so that they may have fulfilled the requirements of the Weeks laws and thus be in a position to receive federal aid.



PLATE I.

THE FOREST AS WE WISH TO KEEP IT

A BIRD'S-EYE VIEW OF THE NOONTOTLY RIVER
VALLEY IN NORTHERN GEORGIA, FROM ROCK
CREEK DIVIDE. THE MOUNTAIN SLOPES ARE
HERE COVERED WITH FORESTS



PLATE II.

ENTER THE MOUNTAINEER

HIE HAS BURNED A PLOT AND LEFT THE TREES
STANDING, AND AMONG THE DEAD AND BLACK-
ENED TRUNKS HAS SOWED CORN. A CORN-
FIELD IN DEADENING ON SUMMIT OF DIVIDE
BETWEEN ROCK AND LONG CREEKS IN NORTH-
ERN GEORGIA



PLATE III.

EXIT THE MOUNTAINEER

HE HAS FOUND HE COULD NOT FARM ON HIS
LAND. AN OLD ABANDONED FIELD ON SUMMIT
OF DIVIDE BETWEEN DAVIS AND STOVER
BRANCHES OF NOONTOTLY CREEK IN NORTH-
ERN GEORGIA



PLATE IV.

THE END OF IT ALL—RUIN, WASTE, DESOLATION

EROSION OF ABANDONED FIELDS
IN NORTHERN GEORGIA

PRESENT FOREST PROBLEMS OF MASSACHUSETTS

BY ALLEN CHAMBERLAIN.

FORESTRY in Massachusetts was developing in a most encouraging manner until the advent of the legislature of 1911, when it became to a considerable extent the plaything of politics, and it is more than suspected that the element of personal animosity has contributed to the obstacles thrown in the path of further advancement. Two years ago, at the behest of the governor, the work of suppressing the gypsy and brown-tail moths, those terrible forest pests against which the state has so long been fighting, was added to the forester's labors. To enforce the law requiring the suppression of these insects, and to spend the state's contribution of money to this end with effectiveness and without arousing local jealousies, is a difficult task. Nowhere in the service of the state is the force of political pressure felt more persistently than in this work. Through that office nearly a million dollars is expended annually, and while only about one-third of this comes directly from the treasury of the state, it must all be applied under the general direction of the state's director. It is not easy to provide for the spending of such an amount of money in public work, and to guard against waste and dishonesty, and it is equally difficult to administer the somewhat drastic law behind the work without at times treading upon the toes of high political influence. It was an unfortunate day for forestry in Massachusetts when this moth campaign was saddled upon the forester's office.

Throughout the present session of the legislature the office has been the subject of attack, chiefly on account of the moth work, charges being made which were entirely unsupported by reliable evidence, and which fell flat after a thorough investigation of the department had been made by an investigator appointed by the governor, who is himself not friendly to the work. As a result of the pulling and hauling incident to this conflict the several forestry bills all fell by the wayside, deserted even by the members of the committee on agriculture. Only one measure, an amendment to the forest fire laws, succeeded in passing, and that came through in a sadly riddled state. This was in spite of the concerted efforts of the Massachusetts Forestry Association and the Boston Chamber of Commerce, both of which labored energetically through special committees in support of several bills.

Not in many years has Massachusetts been subjected to so terrible a fire scourge as has fallen to her lot the past spring. By the middle of May the losses were easily twice as great as for the entire twelve months of 1910. And yet during the height of this fire season, when the papers were daily reporting fires from all parts of the state, ranging from a few hundred acres in extent up to ten thousand acres, the legislature rejected, almost without debate, a bill calling for \$10,000 and authority to establish a state fire warden. This bill was supported by the Massachusetts Forestry Association, by the Boston Chamber of Commerce, by woodland owners and timber operators, and it was presented and backed by members of the legislature in every way qualified to command the attention of their fellows. Strangely enough it was the members of the committee on agriculture who rallied to its defeat, running into the lobbies even to summon votes to insure their end. When the farmers of Massachusetts

play politics to that extent at the expense of a vital question affecting their own woodlands the situation is rather discouraging. One is led to wonder if the enthusiasm for forestry exhibited in past years was really genuine, and if these legislators actually reflect the wishes of their constituents.

There is no state in the country where forestry has a better opportunity to succeed commercially from the very start than it has in Massachusetts. Here are vast tracts, in all parts of the state, perfectly adapted to the production of the best timber, and valuable for nothing else. Most of this area is today producing only inferior mixed growths, which, at present stumpage values for good timber, it does not pay anyone to grow. To hold one's woodland property in such growth is like investing money in two per cent securities when equally sound investments can be found which pay four per cent. Moreover, Massachusetts has an active home market for this timber. But real and widespread interest in commercial forestry in this state will never be aroused until Massachusetts does two fundamentally important things. First of all the fire hazard must be reduced to a minimum, and second the present system of taxing forest property on the basis of a house and lot must be put aside with such other antiquities as bull's-eye watches, flintlock guns, and overshot water wheel saw-mills.

To stop the fire loss is a comparatively simple matter. Massachusetts has law enough on the subject in the main at present. What is lacking is a whole-hearted public sentiment which will demand the enforcement of those laws. When a man knows that his neighbors will regard him as more lawless than a horse-thief if he starts a fire out of doors under dangerous conditions, thereby jeopardizing the property of the entire community, he will think twice before he strikes the match, and the chances are that he will decide not to strike it. Now and then a fire will get started from some cause or other, of course. Even in Germany they have fires in the forest occasionally. But these fires need not run over ten or fifteen square miles, wiping out houses and barns as they go, and thousands and thousands of dollars' worth of forest. The state must see to it that this loss of taxable property is prevented. It must require the towns to install adequate and up to date equipment for combatting such fires as do get started, and it must see that an efficient organization is maintained to use that apparatus. Patrols must be required during dangerous times, and lookout stations should be provided on the heights. By manning a few of the many observatories already in existence in various parts of the state a lookout system could be inaugurated at trifling expense, for it must be understood that it is only during the driest times that this watch service would be required. To set up an efficient organization in every town, and to see that these organizations know how to use their weapons and to meet their enemy, a state warden in chief is essential, a man who knows his business, one who has had his lesson scorched into him on the fire line, and who can teach and command. His authority should be defined by legislative enactment, and his powers should be broad. Such a man could easily be found, and his pay should be sufficient to attract the best man in the country, and to hold him on the job. ✓

Massachusetts has already recognized the need of providing the towns with modern tools for fire fighting by making available the sum of five thousand dollars a year of state money with which to assist the less well-to-do towns in thus equipping themselves. But what is the use of putting machine guns into the hands of men ignorant of their mechanism and use? It requires a systematic organization and training to use effectively a battery of chemical extinguishers in a forest fire. Moreover the state should have the right to inspect from time to time at least such equipment as it helps to pay for, to

insure its being kept in proper fighting order. If the state pays half the cost of a wagon it has the right to know that it is properly housed against the weather, and that the extinguishers are not allowed to freeze and burst. The duties of the state warden, who, of course, should act under the orders of the state forester, would be many, and profitable to state and to towns alike. There can be no question as to the profitableness of an annual investment of ten thousand dollars for such a service. The state is today spending a like sum yearly in making forest plantations, every one of which runs the hazard of fire owing to the hit or miss arrangements for fire fighting which obtain in most of our country towns. Better suspend the reforestation appropriations and devote the money to guarding what we have against destruction. At present forest plantations are a gamble.

To meet the taxation problem is not so simple since it has been held that under the Massachusetts constitution the legislature cannot classify property for taxation purposes. All taxes must be proportional. A strenuous effort was made a year or two ago to have the constitution amended so that classification would be possible, and although failure was the only result hope has not yet been abandoned. Until this is brought to pass so that forest land may be assessed on a land value each year, while the crop is allowed to pay its tax only upon maturity, forestry as a business cannot thrive as it should. But pending the arrival of that happy day when woodland property is assessed on a logical basis, it is the duty of the state to insist upon the control of fires, and to assist in that control in a practical manner.

Massachusetts has a great opportunity to grow timber as a by-product on some of her state and municipal lands. During the past twelve years the state has been buying forest lands on its greater hills, and setting them apart as recreation grounds, to be maintained in natural condition. In this way six reservations have thus far been established, all in the central and western counties. To be sure the aggregate area is not great, only twelve to thirteen thousand acres, but it is all wild forest land, admirably adapted to timber culture, and good for nothing else aside from the recreation feature. On some of these timber plantations have already been started by the commissioners in charge, but much more should be done, and doubtless will be done as the years progress, thus supplanting the largely worthless second growth woods with really fine forest. There is not the slightest reason why these rehabilitated forests should not in time be made to yield a revenue. From portions of these areas, at least, the timber can be harvested without seriously interfering with their value as recreation grounds. There is every reason also why the state should continue this policy of buying reservations in the hilly sections, but for the specific purpose of reforesting, the recreation feature becoming secondary.

Then, too, many of the cities and towns of the state already own lands, in connection with their water supplies, which might easily be made revenue producing if devoted to timber growing. Such a use is certainly in no sense inimical to the water supply, and unless they are so used these lands become an unnecessary burden upon the communities owning them through the failure to develop their potential possibilities. Why charge the keep of these lands entirely to the annual tax levy? Why not put under management the existing woodlands on these watersheds, and plant up the remainder with timber trees? A year or two ago the state forester put these questions to the cities and towns of the state, and ten responded at once asking to be given professional advice. Some of these have already begun planting, but there are many more that should be interested in this plan, and the state forester is ready to lend them all the help they require in order that they may make a beginning. Timber could be grown on such lands very cheaply

since the cost of the land itself does not become a charge against the timber, it having been purchased for another purpose, and since it could not be devoted to any other use in connection with its water conserving properties. Nor does the tax problem burden their publicly owned tracts. The timber would be a by-product of pure "velvet."

Doubtless when the state has decided to put an effective brake on the fire evil greater interest will be taken in such state and municipal forests, as will certainly be the case with private enterprise in this field. But where state and municipal interest would probably respond at once, could the fire hazard be largely eliminated, private interest will lag until the tax problem also has been solved. Both problems are today being juggled with by the politicians, and they will continue to be until the public sentiment of the state declares that they must be considered on their merits, and solved in a thorough-going and permanent fashion.

Such progress as has been made for the betterment of the woodlands of Massachusetts has been well-considered on the whole, and no real retrogression is possible. Progress has only been temporarily checked by the political situation of the moment. Perhaps in the end it will prove to have been for the best. Already the agencies which have chiefly contributed to the past gains have shown signs of renewed zeal, and plans are being made with care and much forethought to arouse the lagging public sentiment of the state, and to carry on an aggressive campaign against the reactionary element in politics.

The Massachusetts Forestry Association has been able to accomplish far more for the advancement of forestry in the state than its enthusiastic founder, the late Joseph S. Nowell of Winchester, or any of his devoted co-workers ever dreamed possible in so short a time. Those men and women who had in charge the shaping of the policies of the association, laid the foundation of the forest policy of the state. What they did was not accomplished by sitting in somnolent council, nor through making speeches in public gatherings. The successes of the association were due to the forceful daring of a few leading spirits, often at the sacrifice of personal convenience plus many contributions of money when the work of the association demanded greater funds than the treasury could supply. It took nerve and conviction for example to lead the association to employ a forester for the benefit of the state at large after the legislature had more than once refused to create a state forest office. That action served to show the usefulness of such an officer, and the following year the legislators took the hint.

Since then the state forester's office has seemingly been expected to conduct not only the field work for forest extension, and for fire suppression, but the missionary work as well, and largely single-handed. A renewal of the policy of close coöperation between the forester's office and the association will undoubtedly result in far greater advancement than would otherwise be possible. Such coöperation is not as simple in practice as it might seem at first glance. It involves a vast deal of self-restraint on the part of the coöperators. The best intentioned efforts on the part of a citizens' organization may easily be mistaken for meddlesomeness, or a desire to unduly interfere with the official. The forester has a right to expect from a forestry association all the counsel and encouragement that it can give, and if the two agencies come together with a true singleness of purpose to advance the interests of the cause they both are pledged to support, and without any thought or attempt to make political capital or personal aggrandizement out of campaigns they plan together, there will be small chance for misunderstandings to arise.

The recent lively interest manifested in forestry by so important a commercial organization as the Boston Chamber of Commerce is a most hopeful



YELLOW POPLAR ON NOONTOTLY
CREEK, NORTHERN GEORGIA



CHESTNUT INJURED BY REPEATED SURFACE FIRES
BETWEEN ROCK AND FORTNER CREEKS, NORTH-
ERN GEORGIA

sign, not only for Massachusetts but for New England as a whole, for the membership and influence of the Chamber extend over that entire section. Through an energetic committee on forestry, composed of active business and professional men, some of them lumbermen, and all much interested and well-posted in the subject, the Chamber is working in harmony with the forestry association, and is ready to enter fields not so readily accessible to the association. The machinery for producing important results is, therefore, well-nigh perfect in Massachusetts, and there is no reason why it should not work smoothly and speedily. The test will come during the next twelve months.

A RAILWAY'S FOREST ENTERPRISE

By FILIBERT ROTH.

IT IS well known that the Canadian Pacific Railway Company for years past, has been actively engaged in the agricultural development of the great Canadian Northwest. Not only has the company encouraged and assisted agricultural settlement, but it has established experiment stations, demonstration farms, irrigation enterprises, etc., to develop right crops and right methods for the best utilization of the great plains lands.

Of late this company has turned its attention also to forestry. As a holder of large areas of forest lands in different portions of Canada, notably British Columbia, it has begun work in the usual quiet and yet energetic and businesslike way which so long has been a distinguishing feature of this company. The objects and policy of the company, as indicated by the head of the forestry department, are primarily to develop thorough protection for the great forest wealth along the lines of the railway. That this is a most timely enterprise, meeting with the hearty approval of every right-minded person, interested in the welfare of Canada, goes without saying.

The necessity for this was amply demonstrated by the experience of 1910 and by the enormous destruction of forests of other recent years. But in addition to this work of fire protection, the company plans also the establishment of a regular forest service to take charge of certain forest tracts and develop on these tracts a system of forestry, well planned and thoroughly suited to the country, to the forest, the land and climate, and to the economic conditions of the different regions in which these forests are to be selected. That such work will serve, like the agricultural stations, as a valuable object lesson, is quite apparent. That these forests may also serve as supply areas for the timber used by the company, would seem quite natural, though this appears rather secondary in the program at the present time. At present the company has a number of educated young foresters in addition to its old staff of experienced timbermen and all in all, it has probably the best organized and most promising forest service of any private concern in the New World.

That this development will serve a most valuable purpose, not only for the railway company itself, but for Canada and for each of the provinces, is evident; and the work will be watched with great interest by every friend of forestry. Good Speed!

REPRODUCTION OF ENGELMANN SPRUCE AFTER FIRE

By L. J. YOUNG.

I.—PARKS AND THEIR ORIGIN.

MUCH of the beauty and picturesqueness of the extensive forests of spruce and balsam that clothe the higher slopes of the mountains in southwestern Colorado is due to the many so-called "parks" that are scattered through the timber. As locally used, the term means any grassy opening in the forest, regardless of size, for they vary in extent from less than a single acre to many hundreds of acres. That they have been rightly named, anyone must admit, especially if seen in early July just after the snow has left them. Then they are covered with thick, fresh grass and an abundance of brightly-colored blossoms from the big, gorgeous columbine of the Rockies to the delicate, little, blue bells of the aconite flower. The whole effect of the grass, the flowers, and the little scattered clumps of trees cannot be excelled for quiet, peaceful beauty, placed as it is in the midst of the big, dark forest, which offers its long, mysterious vistas as a background to the scene. A park in a city is only an imitation.

However, these parks have much more than beauty to their credit, for it is upon them that the stockman depends for a great part of the summer range, which he must have to maintain his great flocks and herds that mean meat and wool and hides to the people of the East. So we see that the park has also a considerable economic significance that is not to be despised.

Upon seeing these parks for the first time, admiration is pretty apt to be closely followed by curiosity as to the reason for the existence of such openings, where the conditions of soil and moisture are, so far as it is possible to see, the same as in the dense forest just alongside. Inquiries among the people do not give much satisfaction on this point, for all they are so wise in many things not known to "tenderfeet." But the story is there for anyone who has a chance to read it. A summer's work in the Engelmann spruce of the La Plata Mountains in southwest Colorado gave the opportunity for observations, the conclusions from which form the basis of this paper.

It is so simple that the pictures alone can almost tell it. But it will doubtless be much clearer if a few remarks are added to furnish the connecting links and bring out certain facts that the pictures do not show.

Figure 1 shows part of a stand of fire-killed timber, where the damage has been comparatively recent, since most of the trees are still standing. Not only has the timber been killed here, but all the young growth, together with the forest floor, has been destroyed. After such a catastrophe, one of two things usually happens. Either grass gains possession of the ground soon enough to seriously hinder the return of the spruce by seeding, or the light seeds of the aspen blow into the area in large numbers and establish a dense stand before even the grass has had a chance. The picture shows the grass and shrubs appearing in this particular case, as well as a few spruces in the background that have come up since the "burn."

As time goes on, one dead tree after another blows over and begins to decay, until the timber is practically all down, as in Figure 2. This is the next step in the process that was begun by the fire. The grass has become still more firmly established, and part of the timber that went earlier has decayed and disappeared. The exposure of the area to the action of sun and wind has made conditions very unfavorable for the moisture loving spruce, so that only a few have gained a foothold near the edges of the "burn."

After the timber is once down and in contact with the ground, the processes of decay go on much more rapidly, and in a relatively short time, the area assumes the appearance of that in Figure 3. Most of the timber has gone back to the soil and air from which it came, and what was once a heavy spruce forest has already become a summer home of the cattle, tempted thither by the abundant grass.

The final decay of the small remaining amount of dead wood leaves a clear, grassy expanse, either dotted with scattered spruces or absolutely treeless, and the park has arrived at completion. (See Fig. 4.)

Now someone may ask whether some parks at least may not owe their existence to windfall. It is true that large areas of spruce are sometimes blown down, thus forming openings in the woods. But there are several reasons why these areas do not become parks. For the sake of completeness, it may be well to briefly state those reasons here.

An unusually heavy wind may overthrow all of the timber on a given area, but the destruction is not complete, as in the case of fire, since many of the small trees, most of the seedlings, and the forest floor, or duff, are left unharmed by the wind. The presence of the duff and the shade afforded by the down timber tend to prevent for a time the unfavorable drying out of the soil, so that the seedlings that are left have a chance to readjust themselves and continue to grow, and seed that blows in from the nearby timber has a better chance to germinate. On account of these conditions, the area is again more or less covered with a young forest before the down timber has had time to disappear.

Again, most of the parks occur on south slopes, and practically all of them occur on south, east, or west slopes. These exposures are the ones that are most subject to drying-out, so that fire starts most easily on them and also runs more readily after it is once started. Practically all areas that still show evidences of burning-over are also on the same slopes. This strengthens the appearance of a relation between the two.

A little digging in any park soon reveals charcoal not far below the surface, showing conclusively that fire once passed over the area and found timber to feed upon where there is none at present.

The circumstances, therefore, seem to point to the conclusion that fire, and fire only, has been the primary cause of parks.

II.—THE FATE OF THE PARK.

Next comes the question, Does the park, once formed, always remain a park?

Take the case of such a park as is shown in Fig. 4, where a few spruces have succeeded in starting before the grass came in. On account of their open position, such trees have branches clear to the ground. These branches shade out the grass around the base of the tree and keep the soil relatively moist and loose. Such conditions are favorable to the germination of the seed, some of which the tree is bearing nearly every year. The result is shown in Figure 5. A large number of seedlings of all sizes have grown up around the "mother tree" in the area protected by its branches.

As these trees continue to bear seed that is carried here and there by the wind, other trees occasionally succeed in starting at some distance from the

mother trees, in spite of the grass. (This probably happens chiefly during unusually favorable seasons.) Such trees in turn become the centers of additional groups. The seedlings themselves in each group grow into trees, bear seed, and continue the work of conquering the grass. Each group also continues to spread and so shade out more grass, which favors the starting of still more seedlings. All of this takes an immense amount of time, on account of the slow growth of the existing trees and the difficulty with which new ones get started.

But, slow as it is, there comes a time when the number of groups has increased sufficiently and each one has so spread out that all of them are in contact with one or more other groups. This is the last stage before the complete return of the forest. Small openings, a few yards in diameter, still occur, but most of the land is now covered with trees. Figure 6 shows a portion of such a stand. Practically all of the trees in the picture have come from the large mother tree, marked "x." The opening here is only ten paces wide. It is interesting to note the wide variation in size, and so in age, of the different trees. This stage also shows that the very small parks are only a result of the breaking up of the large ones.

Ultimately, of course, all of the small openings are filled up, and the forest cover is reestablished after an interval of hundreds of years. Extensive stands occur at present which have obviously originated in this way. They are extremely uneven, aged, and, though the cover is complete, can still be easily resolved into the original groups with the big mother tree distinguishable in the center of each one. The very conical form of these mother trees and the numerous, persistent branches that extend clear to the ground prove that they lived a great part of their existence in the open, rather than in such a closed stand as the present one.

The filling-in process, described above, is further hastened by a seeding in from the side along the edges of the timber that remained uninjured by the fire.

Fig. 7 shows a narrow arm of a park that is being rapidly filled up from the end and sides.

III.—REPRODUCTION OF SPRUCE UNDER ASPEN.

Since the seed of the aspen is very much lighter than that of the spruce, it is carried by the wind for longer distances and in large numbers. When such seed falls into a fresh "burn," where grass has not appeared, it produces a dense stand of this inferior wood. If there were such a thing as a portable pulp-mill, however, there ought to be some money even in aspen.

These stands often cover extensive areas, growing to an average diameter of twelve to sixteen inches and an average height of sixty to seventy feet. Apparently they own the land. But——

Usually the aspen is surrounded by spruce forests. Now spruce can start and grow well under the shade of aspen, but aspen cannot live under spruce. Every year some spruce seed blows into the edges of the aspen stand and starts to grow. In time, the trees thus started also bear seed, which they scatter farther into the ranks of the aspen. (See Fig. 8.) Finally, the spruces and balsams overtop the aspen and kill it with their heavy shade. The aspen is also at a disadvantage in being a short-lived species, while the spruce is long-lived. Thus it is that aspen is called a "temporary" type. The spruce has triumphed again, but in this case does not show the group arrangement that is so characteristic when the park was the first step in the process.

It was also found that spruce sometimes reproduces without interference from grass and without the aspen stage upon areas near timberline that have been denuded by fire or by snowslides.



FIG. 1.



FIG. 2.

ENGELMANN SPRUCE



FIG. 3.



FIG. 4.

ENGELMANN SPRUCE



FIG. 5.

ENGELMANN SPRUCE



FIG. 6.



FIG. 7.



FIG. 8.

ENGELMANN SPRUCE

FORESTS AND STREAMFLOW

DISCUSSION of the relation of forests and streamflow is neither new nor peculiarly American. Engineers, foresters and hydrologists in Europe have been debating it for many years with the result that while controversy continues as to the precise relation of the forest on the watershed to the flow of the stream, European opinion has accepted as settled the opinion that forests are necessary to the maintenance and equability of streamflow, and has acted upon it.

In this country practice, since we took up forestry, has followed the same conclusion, but when the judiciary committee of the House of Representatives gave its opinion that the proposed Appalachian national forest legislation must stand or fall by its effect upon navigation, the whole question was thrown open to be debated with some heat and some scientific thoroughness. This controversy is recent history. Several printed papers were contributed to it, the first being that of Lieutenant Colonel Chittenden, of the army engineer corps, who argued ably and forcibly against the accepted view. His position was substantially that held, so it is understood, by a majority, though not all, of the army engineers. Colonel Chittenden was answered by Prof. George N. Swain and others. Outside of those whose preconception was supported by the views of the army engineers, there was an unwillingness to regard the army men as the only engineers in the country, and when eminent civil and electrical engineers controverted their views, and the great national organizations—the Society of Civil Engineers, and the Institute of Electrical Engineers—were put on record officially as believing in the beneficial effect of forest cover on streamflow and the actual need of such cover to protect watersheds, the normal judgment of the layman seemed to be restored to its former basis.

Then came the report of the Chief of the United States Weather Bureau, issued something over a year ago as a congressional document and widely distributed. This raised a distinct issue between two bureaus of the Department of Agriculture—the Forest Service and the Weather Bureau; but the restraint of department discipline prevented a rejoinder by the Forest Service, and the controversy was carried on outside, the weightiest contributions to it as opposed to the Weather Bureau's position being the articles by able specialists published in *AMERICAN FORESTRY* for April, 1910.

These steps in the controversy are recalled because it is reviewed at some length and with an intelligent understanding of its animus in the *Indian Forester* for March and April, 1911. The *Indian Forester* quotes an editorial from the *Allahabad Pioneer* referring to the controversy and then publishes a letter from one of its correspondents calling attention to the *Pioneer* article and suggesting that "the whole makes very interesting reading and those who live for tariff reform and similar many-sided questions and are in need of something new would be well advised to add this subject to their list as it is one not likely to be exhausted in their time." The *Forester* then states the two contentions of the American Weather Bureau as follows: (1) that forests have no effect upon the amount of rainfall; (2) similarly, that forests have no effect upon the severity of floods; and it is concluded that no case can be shown where deforestation has augmented drought or flood. To the dis-

cussion of these propositions the *Forester* contributes a few observations out of experience in India:

"As regards (1) there are in India no series of reliable observations carried out over a sufficiently long period to throw much light on the subject.* The Proceedings of the Asiatic Society of Bengal, 1887, Part II, No. 1, contain an interesting article by Blanford. He showed that the only satisfactory evidence would be that obtained by comparing the rainfall of a district when well wooded with that of the same district after deforestation. He endeavored to apply this principle to the southern Central Provinces. He gives evidence that in that area prior to 1875, while five-sixths were nominally under forest, so much damage had been done by *dahya* (i.e., shifting) cultivation that by far the greater part of the forests had become devastated. He quotes the introduction of the Central Provinces Gazetteer of 1870 where Mr. C. Grant says:

"The tree forests of the Central Provinces have, however, been so much exhausted, mainly owing to the destructive *dahya* system of cultivation practiced by the hill tribes that, except in one or two localities, the labors of the forest officers will, for many years, be limited to guarding against further damage, and thus allowing the forests to recover themselves by rest. By far the greater part of the uncultivated lands, belonging to government, are stony wastes, incapable of producing a strong straight growth of timber."

"In 1875 the suppression of *dahya* cultivation was taken in hand and with such success that in 1886 Mr. Ribbentrop, then inspector general of forests, wrote:

"My attention was directed, during a recent visit to the Central Provinces, to the extensive growth of young forests, in areas formerly under shifting cultivation. Ten or fifteen years ago, such temporary cultivation was practiced throughout the country and thousands of square miles were thereby laid barren, year after year. Since then, this method of cultivation was stopped, and, though a great part of the area affected was subject to annual fires, a more or less dense forest growth has sprung up."

"Blanford then compares the rainfall of the area affected by forest preservation with that away from it; and shows that while the rainfall in the preserved area, averaging about 50 inches, was greater by 6.8 inches for the period 1876-85 than it had been for the ten years before, the rainfall in the remainder of the Central Provinces had diminished by 2.9 inches. Blanford points out that the area in question of nearly 50,000 square miles is large enough to give reliable results, that its history is well known, and considers that the only points on which doubt may be thrown are the reliability of the records and the sufficiency of the periods to yield valid averages. The results of the different stations were so consistent that Blanford held that the measurements might be trusted, and it would appear that there was an increase of about 9.7 inches (or 20 per cent) due to the growth of forest.

"There are, as far as we are aware, no other reliable data in India by which the rainfall over a well wooded area can be compared with the same area when deprived of its forests. Observations carried out for a number of years in Ajmer go to show that the rainfall inside the forests is greater than outside, but these observations are not considered reliable. On the whole the general result of the enquiry is that there has been no permanent alteration in the amount and distribution of the rainfall during the past half century either one way or the other. During this period the government of India have pursued a wise forest policy by which immense areas have been maintained under forest and rescued from impending destruction. The area

*From information furnished by the Director-General of Observatories in India.

of forest under the control of the Forest Department today stands at 241,774 square miles, and the question may well be put whether India would be getting more or less the same rainfall now as it did 50 years ago if the destruction of the forests had not been checked in time.

"This question has received much attention in Europe. In the forest of Haye near Nancy, for example, a series of observations were kept up for 33 years with the result that, taking the rainfall in the center of the forest as 100 centimetres, the rainfall at the edge was 93.9 and that outside was 76.7 or a decrease of 23.3 per cent. These proportions were ascertained to be independent of the wind direction and the influence of the forests is also independent of the seasons.

"The most authoritative work on climatology is perhaps the *Handbuch der Klimatologie* by Dr. J. Hann. In Volume 1, pages 186-193, 1908, will be found a full summary of the results of European and American observations on the influence of forests upon air temperature, ground temperature, humidity, rainfall and the run-off. As regards rainfall he finds that the amount falling inside the forests in Germany is about three per cent larger than that outside. In the tropics there is reason to believe that, as shown by the example of the Central Provinces referred to above, the difference may be considerably greater than this.

"At the same time it may at once be admitted that the influence of forests on the total rainfall is in the case of India uncertain, and on the Continent, although divergent views are held, it is generally held not to be of any great importance.

"In India no doubt the total rainfall depends on the monsoon currents which are affected by the conditions which obtain in the Indian Ocean and sub-equatorial regions. Nevertheless, there is good reason to believe that the rainfall is heavier by perhaps nine per cent over well wooded districts than it is over similar adjoining districts which have been deprived of their forests."

The *Forester* then reviews briefly the contributions to the discussion by John H. Finney, Professors Glenn, Roth and Swain, and Barrington Moore in AMERICAN FORESTRY and then adds the following statement in regard to various districts of India:

"In India reliable data as to severity of floods in main rivers fed from catchment areas under forest conservation as compared with those in rivers fed from catchment areas which have suffered from deforestation are in the nature of the case practically *nil*, and it seems that nothing short of a series of observations carried out on a river fed from a well wooded catchment area and again on the same river after all the catchment area had been denuded of its forests, could absolutely prove the effect of forests on the severity of floods in the main rivers. The enquiry lately carried out shows on the whole that there is no increase in the severity or duration of floods in most of our main rivers, and here again it may well be asked what would have been the state of affairs had not the Government of India pursued a consistent forest policy for the past fifty years? It is owing to this policy that a considerable proportion at least of the catchment area of most of our great rivers is well wooded and that the evils following deforestation have been minimized.

"If evidence regarding the influence of forests on floods in the main rivers is wanting, or circumstantial only, it is otherwise concerning the floods which occur locally in the catchment areas, and the damage and erosion of the hillsides which surely follow disforestation. It is here that the protective effects of forests and the injuries caused by their removal is most marked and reports from numerous sources show that in India as elsewhere disastrous effects have closely followed disforestation.

"Mr. McKenna, the Director-General of Agriculture in Burma, writes:

"The dry zone of Burma, and particularly Myingyan district, affords an excellent example of the evil effects of erosion. The country has the appearance of rolling landscape, the tops of the heights consisting of hard shallow soil (the Kyatti Kon of the Burmese cultivator) which is incapable of producing anything but the poorest crops of sessamum, cotton and jowar. The rainfall is low, but heavy falls suddenly take place and the water which falls, having no chance of being collected and held by humus, rushes down into the hollows, carrying off the soil and breaking up the country by innumerable small waterways. So broken have these lands now become (not to mention that practically only the rock is left) that cultivation on a large and successful scale is impossible. As a general rule, the eroded soil is not deposited at all, but is swept by the smaller torrents into the large waterways, where some damage may be done to crops on the banks. Afterwards it reaches the Irrawaddy and helps to form the sand-banks which imperil and impede navigation on that river and in the long run finds its last resting place in the ocean. 'The oceans are the burying ground of the continents' is one of the maxims of the geologist, but the process can be lengthened and impeded by afforestation, so that the loss to mankind is considerably lessened.'

"The dry zone of Burma was formerly covered with forest which has now for the most part disappeared.

"In the Punjab much damage has been done by erosion caused by floods following disforestation in the outer slopes of the Siwaliks and in the Pabbi Hills. Enquiries made in connection with the Upper Jhelum Canal Works have shown that many of the streams that run off the northern slopes of the Pabbi range of hills, formerly covered with forests, but now bare, have scoured out great ravines and channels and cut away much valuable land.

"The case of the Hoshiarpur Chos is well known. Here owing to destruction of forest growth and excessive grazing, destructive torrents had formed, and these carried vast deposits of boulders, silt and sand down on to the fields below. These torrents put out of cultivation and rendered useless very extensive areas of land. Following the example of France, a special act was passed in 1900 providing for protective measures on the hillsides which are now slowly being reafforested. The damage is already reported to be diminishing.

"In Bengal extensive denudation has taken place in Chota Nagpur and Orissa, and the consequent damage by floods and erosion is becoming alarming. A committee has been appointed to examine and report on the question, and have come to the conclusion that the only way to stop the damage is to protect the forests, and as in Hoshiarpur they recommend special legislation for this purpose."

THE WAGON WHEEL GAP EXPERIMENT STATION.

Reference has already been made to the issue that was raised between the Forest Service and the Weather Bureau when the Chief of the Weather Bureau entered this discussion with his report on the influence of forests on climate and on floods. A very sensible and useful way of harmonizing this controversy has been reached through the establishment of an experiment station in the Rio Grande national forest which is to be controlled jointly by the Forest Service and the Weather Bureau, the object being to determine the effect of forest cover upon high and low water stages of mountain streams, the run-off of mountain watersheds as compared with annual precipitation and the erosion of the surface of the watershed. A detailed description of the station at Wagon Wheel Gap and the methods of the experiments proposed was given by Mr. Carlos G. Bates in the last number of *The Proceedings of the Society of American Foresters*. Necessarily these experiments will not

give any immediate results—they can only be satisfactory when pursued with great care for a term of years. Briefly the plan is to compare two watersheds adjacent to each other on which practically the same conditions exist, one being forest covered and the other denuded. Mr. Bates describes the two watersheds as follows:

"The two watersheds at the Wagon Wheel Gap Experiment Station are very much alike with respect to topography, soil, and vegetation cover. A good deal of difficulty was encountered in finding two such similar areas at an altitude which represents a mean between the heavily-watered mountain tops and the low-lying areas where the streams are not permanent. The area of Watershed A is 223 acres and of Watershed B 212 acres. The former has a total length of 7,100 feet and a maximum width of 1,800 feet. The latter has a length of 4,600 feet and a maximum width of 2,500 feet. It may thus be seen that Watershed A is longer and narrower than Watershed B. The visible lengths of the two streams are 3,400 and 2,300 feet, respectively. Both streams have an easterly bearing, flowing out of the mountains on to the broad bottom of the Rio Grande, where, excepting at the highest stage, they disappear in the loose soil of the river bottom.

"The altitude of Watershed A is from 9,375 to 11,360 feet, while Watershed B lies between the elevations of 9,240 and 10,940 feet. At these elevations precipitation is sufficient to feed permanent streams. I think it is safe to say that the streams in question have never gone dry, since the season of 1910 represents an almost unprecedented drought in this locality and the streams at the end of the summer showed discharges of .075 cubic feet per second and .050 cubic feet per second, respectively, or about 20 per cent of the annual mean discharge.

"In each case the forest cover consists of Douglas fir in the lower reaches and Engelmann spruce at the higher altitudes. Douglas fir on north slopes is representative of the Rocky Mountain form of this tree. On south slopes it forms an open stand of fairly thrifty and commercially valuable trees, the litter in most cases covering the ground only in the immediate vicinity of the trees. On north slopes the Douglas fir becomes more and more supplemented by Engelmann spruce as one proceeds upward. At the heads of the watersheds the Engelmann spruce stands have been considerably damaged by fire, followed by the replacement in some cases of Engelmann spruce, but more generally by stands of aspen in which the forest floor conditions are quite good.

"Douglas fir and Engelmann spruce undamaged by fire occupy about 40 per cent of the area of each watershed. In Watershed A the remainder is made up of aspen, under most of which there is good reproduction of coniferous species, and a small area of bristlecone pine. The balance in Watershed B is made up almost wholly of aspen in which there is a smaller proportion of good reproduction.

"Both watersheds have been partially burned, the most recent burns being about 17 years old, the earliest as much as 50 years. The only burn not restocking is at the head of Watershed A and represents about 2 per cent of the area of that watershed. Steps have already been taken to obtain a stand of Engelmann spruce on part of this area, by seed-spot sowing, and similar work has been done in the more open areas of Douglas fir on Watershed A. While the effect of this planting, within the period of the experiment, can be but slight, yet any improvement of the forest cover of Watershed A occurring simultaneously with the deforestation of Watershed B must accentuate the desired contrast.

"As a whole, the forest-cover conditions on both watersheds are fairly representative of conditions throughout the Rocky Mountain region which

furnishes water for irrigation. The areas most subject to erosion are the steep, south slopes where the gradient is frequently as much as 35 degrees and where the trees are far apart.

"At several points on the watersheds there are small areas of "slide rock," and other areas where a soil has only recently been created. Outcrops of rock in place are few in number and represent an extremely small area. Throughout, the fine black loamy soil is interspersed with small stones, yet the depth of soil in most cases is considerable. The streambeds are littered with boulders which have rolled down the steep slopes, and with trunks of aspen trees which are plentiful and of good size along the streams. The debris shows no evidence of erosion and it may be assumed that powerful floods have not occurred in either watersheds for many years. In many places the streams are invisible, flowing under the loose boulders. This feature is more marked in Watershed B than in A. A notable feature is the short branch stream coming in from the north about 400 feet above the dam on Watershed B. This comes from a spring, the water having apparently been carried on the lava substream from higher portions of the watershed, breaking out where the lava outcrops. There is, however, no reason to suppose that the water comes from without the watershed."

Mr. Bates goes on to explain that the primary work of the streamflow study is the accurate measurement of the two streams involved, continuously and without error through all seasons for a number of years. The secondary work of the study includes the measurement of precipitation, temperature and other meteorological factors which may affect the flow of these streams. He then describes at length and very interestingly the dikes, basins, weirs and still-wells by which the flow of the streams can be regulated and measured.

In conclusion Mr. Bates says that the experiment which he has described is the only one of its kind that has ever been instituted, excepted the Emmen-thal experiment in Switzerland near Zürich, and he adds that in his belief it must "always stand as an example of the scientific thoroughness in the solution of forestry problems, which can only be obtained by concentrating the efforts of experts at permanent experiment stations, on the ground. The length of time involved in this experiment must be determined entirely by the occurrence of a variety of climatic conditions. Whether it be ten years or twenty, its results must affect a large number of people, and I believe that it has a claim to recognition by all those who are interested in the problem, whether they be foresters, meteorologists, engineers, irrigators, or merely farmers on river bottoms subject to inundation."



PLATE I. STEEL ROOF SUPPORTS RESTING ON TIMBERS IN BARTON MINE, THE MIDDLE STAGE, HALF TIMBER, HALF STEEL.



PLATE II. STEEL GAUGEWAY SUPPORTS IN EUREKA MINE. THE VERY LATEST. ALL STEEL.



PLATE III. STEEL GAUGEWAY SUPPORTS IN ENTRANCE TO ALLPORT MINE. ALL STEEL AND CONCRETE



PLATE IV. ENTRANCE TO ALLPORT MINE. ALL CONCRETE. NO TIMBERS TO CATCH FIRE AND SPREAD THROUGHOUT THE MINE

MINE TIMBERS *versus* CONCRETE AND STEEL

THE modern up-to-date mine is more and more, where possible, using concrete and steel in place of timbers. If this can be generally done the amount of timber which will be saved, according to statistics obtainable in the anthracite regions in Pennsylvania, will be approximately that covering a hundred and fifty thousand acres. It is an axiom that the price of mine timbers is rapidly increasing and the supply as rapidly decreasing. It has been estimated that the cost of timber per ton of coal mined is eight cents. The saving in mine timbers by the use of concrete and steel is readily conceded.

The accompanying diagram (Fig. 1) shows the various factors which make the timbering of a mine so costly. Decay is the greatest of these; it cannot be prevented; it can only be minimized. Foresters believe it can to a certain extent be overcome by "peeling," by seasoning, and by treating with oils and chemical salts;—but it is produced by bacteria and fungi, which perhaps are in the timber when cut or passed on from other decaying timber in the mine, and which grow through checks, cracks and nail wounds. All this can, to a certain degree, be overcome by preventive measures; but the greatest element in the decay of mine timbers is the condition which prevails in the mine itself,—the lack of ventilation and, above all, the alternating states of dampness and dryness. In the great mine disasters which we constantly read of, the cause is frequently given as decaying timbers which rot and fall burying miners and creating a condition in the mine itself which takes much labor and money to overcome. With concrete and steel "timbering" of course no element of decay enters in.

From an inspection of the diagram it will be seen that breakage, or "crush" or "squeeze" due to a sudden fall of coal and of rock, is the next largest factor. Many times the mine timbers are broken only after they have been weakened by decay. Sometimes new timbers are crushed. Concrete and steel would the better withstand the shock of this sudden deluge. Under breakage, also, wear must be considered. The cross ties in the main haulage ways, the wooden rollers, the drum laggings, are worn by constant contact with the ropes and cables, and concrete construction would obviate many of these difficulties.

Insects also are a factor in the waste of mine timbers. They are usually brought into the mines in infested timber, and passed along indefinitely to sound wood. The waste through decay or fracture of timbers though many times confined to but one part of the set, often renders the whole set useless. The sizes of timbers are sometimes too large, sometimes too small to support the weight, sometimes badly and carelessly set. And this inefficiency affects life and property.

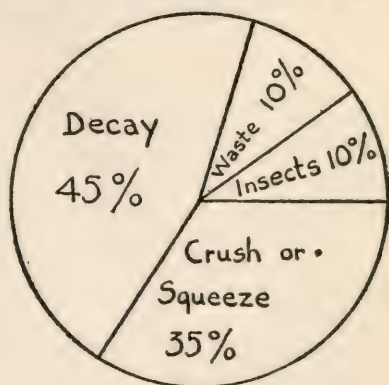


FIG. 1.

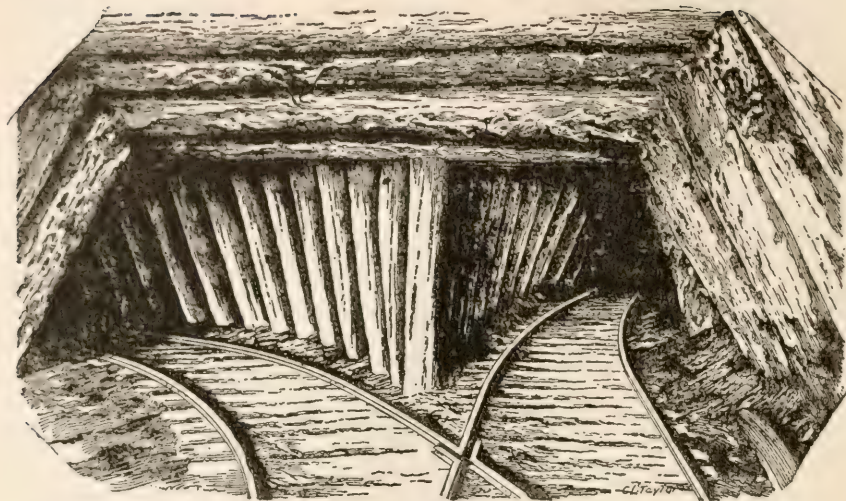


FIG. 2.

In the accompanying illustration (Fig. 2) which shows a mine timbered in the old way; it can be seen at a glance how wasteful is the giving way of one of the timbers and rendering all the rest useless. Also from the illustrations (Plates I, II, III, and IV) of the concrete and steel construction, it will be seen how much more efficient it is, for it obstructs the mine less and gives much better support to the roof. Because of the amount of timber used in the mines it has become necessary for mining companies to be also timber companies. They found that they could the better inspect their timber when it was their own and by cutting down profits in timber effect a great saving. But even now timber is often accepted at the mine in such a condition that it is doubtful whether its service in the mine would pay for the cost of setting it, exclusive of the cost of the timber. A grave indictment is the loss of life occasioned by bad setting, the criminal haste when the contract for setting timbers in the mines is given to the company which is concerned only with placing the greatest amount of timber in the shortest possible time regardless of where or how placed. Perhaps the ordinary mine owner is more concerned with the loss of property than with the loss of his men, and often when mine timbers have been so placed that they cannot properly resist the strain, the whole outlay has been either a partial or a total loss.

It has been argued against concrete and steel construction that it would not be in line with regular practice of preparing a mine for, according to the old way, timber was hauled into the mine, cut on the spot, and fitted in. With concrete and steel construction measurements must be taken and the mine must in a sense be made to fit the supports. But there is no doubt, and it has never been argued, but that the modern construction is better able to stand the strain, that it is safer to life and property and although the initial outlay for concrete and steel is great, yet in the end a saving is effected. No figures are yet obtainable as to the comparative cost.

Much has been done by trained foresters to try to prolong the life of mine timbers. They have made studies of the subject and their conclusions have had weight with mine owners. In 1906, the Forest Service, in coöperation with the Philadelphia & Reading Coal and Iron Company, planned and carried on a series of experiments to determine the best methods of prolonging the life of mine timber. The results of that study are contained in a bulletin—

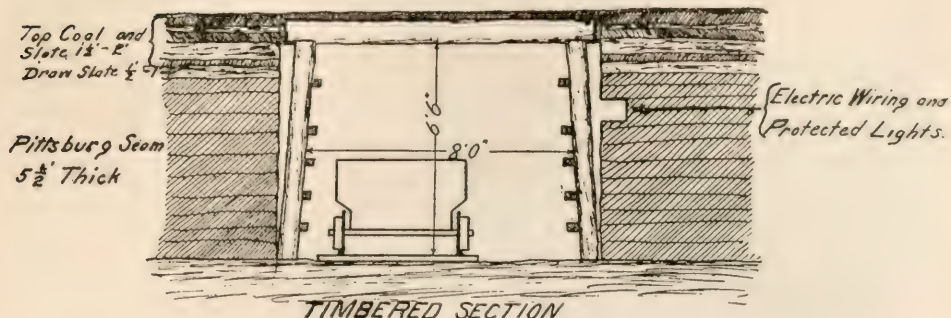


FIG. 3.

F. S. Circular 111, issued Oct. 10, 1907—called *Prolonging the Life of Mine Timbers*, by John M. Nelson, Jr. It is from Mr. Nelson's circular that the diagram (Fig. 1) and the photograph (Fig. 2) have been taken.

Experiments with concrete and steel construction have been carried on for a number of years. The mine which is best fitted out with these modern appliances is the Allport Mine at Barnesboro, Pennsylvania. It is to be noted that in connection with the new government Bureau of Mines a government mine is to be opened at Brucetown, Pennsylvania, in the near future. It is the object of Dr. Holmes, Director of the Bureau of Mines, to make this mine, run by the government, typical of actual mining conditions. Accordingly, parts of the mine are to be timbered in the old way (see Fig. 3), and parts are to have all modern appliances. It is proposed in connection with the government mine, to change the testing chamber where explosives are tried out and where experiments in the explosibility of coal dust are made, from Pittsburg to the new government mine at Brucetown. By having this chamber in connection with the mine it is thought that experiments can be made first in the chamber and then in the mine itself. In this connection, it is noteworthy that the part of the mine in which explosions are to be set off is to be entirely constructed of concrete and steel. (See Fig. 4.) And the government expects to be able to entirely control explosions within this area.

A new era for the mine is approaching, an era without the old waste, the old lack of efficiency. Explosion and fire with its attendant loss to life and property will in the future be done away with. The cost of "timber" per ton of coal will be made smaller and the annual timber consumption will be materially decreased.

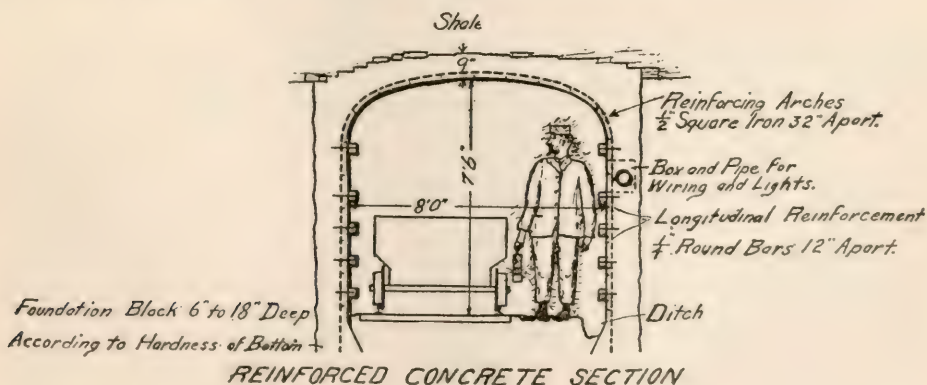


FIG. 4.

LOUISIANA

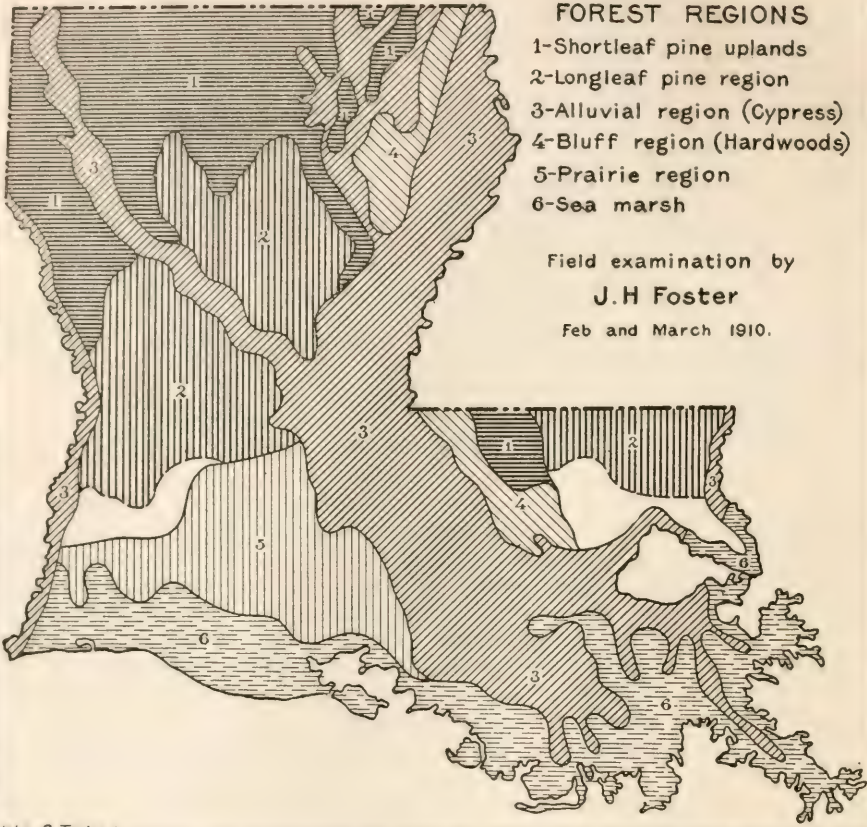
FOREST REGIONS

- 1-Shortleaf pine uplands
- 2-Longleaf pine region
- 3-Alluvial region (Cypress)
- 4-Bluff region (Hardwoods)
- 5-Prairie region
- 6-Sea marsh

Field examination by

J. H. Foster

Feb and March 1910.



THE CASE OF THE STATE OF LOUISIANA

THROUGHOUT the past year an interesting situation has been developing in Louisiana. To understand it thoroughly one must go back a bit with a mental image of the state which has gradually climbed to a position which ranks second only to the state of Washington in the amount of lumber produced annually.

In 1909 the state legislature decided that an inventory of the resources of the state was necessary and appointed a conservation commission for this purpose to make a report to the legislature. Henry E. Hardtner, a lumberman, was made chairman of this commission. The commission at once began its work of making an inventory with the funds appropriated by the legislature for this purpose. This commission for the time being took the place of the state forestry bureau.

In the early part of 1910 with the assistance of an appropriation of \$250 from the office of the register of the state land office and ex-officio commissioner of forestry, the government sent J. H. Foster, assistant chief of coöperation of the United States Forest Service, to look over the forestry resources of Louisiana. Mr. Foster made an extensive report covering some 120 pages to the ex-officio forester.

After review of the timber resources of the state Mr. Foster proceeded to state with great clearness the fallacy of over production. Thus:

"The usual regulation of the supply to meet demand does not hold in the yellow pine industry; the production at present is at least two or three times as great as the market normally requires. It would be a good thing for the forests if all the mills could be run on half time until the present over-supply was reduced and the prices of lumber advanced to a degree which would yield a fair profit.

The consequent effect on the forest of overproduction and low prices is deplorable. Many companies are actually compelled to leave on the ground to decay as much as 2,000 board feet per acre in tops and logs partially affected with red heart, because there is no profit in manufacturing low grades into lumber. The tendency is to haul to the mills only such portions of the trees as will make high-grade material. The lumbermen believe they are in no position to consider conservation methods of logging or to look forward to a future cut of timber on the same land. It would not be entirely just to the lumbermen of Louisiana for the state to regulate or restrict the cutting of timber and thereby increase the cost of logging, unless this increase is uniform among all yellow pine states, and the lumbermen are able to increase the prices of the manufactured product accordingly.

It seems inevitable that the reckless exploitation must continue as long as there is sufficient virgin timber to keep in operation the extensive establishments of the present time. When the big mills have passed, as they are rapidly doing in Alabama and Mississippi, small saw mill plants will be organized on a more permanent basis.

The lumbermen, however, are not without responsibility to the people of the state. They have obtained their lands at low prices and have made fortunes from the increase in the value of the timber. The chief asset of the region is being removed, and the land usually left in a desolate condition. The industry does not develop the country permanently and the earnings are seldom invested where they are of any benefit to the community. Local residents, attracted by work which furnishes them with regular wages, leave the farms for the mills, and when the mills are abandoned, they are too often not satisfied to return to the farm work, but follow the mills to other sections not yet exploited."

This report contained a great deal of valuable information on the basis of which the conservation commission made its report to Governor J. Y. Sanders early in June, 1910. The recommendations of the commission are summarized as follows:

- (1) Protection from fire of cut-over pine lands.
- (2) Prevention of waste in logging, such as: injury to young growth, use of valuable timber where inferior timber would answer the purpose, leaving sound logs in the woods.
- (3) Establishment by gifts and purchase of a state forest reserve.
- (4) Establishment of correct system of forest taxation, viz: (a) "Tax the land without the timber according to its value annually;" (b) "Tax the timber 10 to 15 per cent *when it is cut.*"

Upon the theory that the taxation of the lumbermen should be different from that of all other enterprises, as the facts set forth in the accompanying

table will show, Mr. Foster framed a revenue bill which was introduced into the legislature of Louisiana and passed before the end of the session. This revenue bill became law, but it has been inoperative the past year owing to the activities of certain lumber companies. And this is the reason why, in order to assess the license tax of one cent on pine and one-half cent on hardwoods to produce the revenue by means of which fire patrol is to be maintained, it was found necessary to frame an amendment to Article 229 of the constitution.

QUANTITY AND VALUE OF FOREST LANDS IN LOUISIANA, 1909

I. ACTUAL FOREST LANDS				TOTAL ASSESSED VALUE OF TIMBER LANDS ON A 50 PER CENT BASIS \$125,000,000*
TIMBER SPECIES	TOTAL STAND (ACRES)	AVERAGE VALUE PER ACRE	TOTAL VALUE	
Yellow Pine	4,116,800	\$10.75	\$44,204,009	
Cypress	520,123	12.90	6,249,912	
Hardwood	4,343,744	3.52	15,318,224	
TOTAL	8,980,667	\$6.76	\$65,772,145	
II. FARM LANDS (MORE OR LESS TIMBERED)				TOTAL ASSESSED VALUE OF TIMBER ON "FARM LANDS" \$25,000,000*
(NOTE.—20 per cent of the more or less timbered lands of the state rated as "farm lands" are not included in the above figures.)				
III. DENUDED TIMBER LANDS—(WASTE LANDS)				TOTAL ASSESSED VALUE ON A BASIS OF ONE- NINTH VALUE OF STANDING TIMBER \$7,610,424
ACREAGE	AVERAGE VALUE PER ACRE		TOTAL VALUE	
4,814,746	\$1.58			

Figures from State Conservation Commission Report, 1910.

For in 1902 a general license act had passed the legislature carrying a license tax on the manufacture of lumber and when an attempt was made to collect this tax, the case was carried to the supreme court of the state, which held that the tax was unconstitutional and in violation of Article 229.

Upon the amendment of Article 229 of the constitution, the entire conservation program of the state was found to depend. A joint resolution therefore proposed an amendment to Article 229, which read as follows:

"Those engaged in business of severing natural resources as timber or minerals from the soil or water, whether they thereafter convert them by manufacturing or not, may also be rendered liable to a license tax, but in this case the amount to be collected may either be graduated or fixed according to the quantity or value of the product at the place where it is severed."

Note in the above amendment that no attempt is made to levy a tax on the manufacture of lumber, but on the cutting down of trees. This act protects practically all of the natural resources of the state; the timber, the oil, the gas, and the mineral.

This resolution passed the legislature subject to a referendum vote of the people at the fall election of 1910. The people voted the amendment.

Meanwhile in June, 1910, the revenue bill, framed by Mr. Foster, was passed by the legislature, but with the "tag," contained in section 9:

"Be it further enacted, etc., That this Act shall not go into effect unless and until the proposed amendment to the Constitution of this State, amending Article 229 thereof, has been adopted, which amendment is to be submitted to the people as provided by this Legislature."

Upon the technicality involved, the great lumber companies of the state have held up the revenue bill, claiming in the courts that a bill cannot be effective which depends upon an amendment to the constitution at some future time.

This revenue bill, which involves double taxation, a tax on standing timber and a tax on the timber when cut has therefore remained inoperative the past year pending settlement of the question in the courts.

The general forestry bill, therefore, stands as the achievement of the legislative session of 1910. The bill as originally framed provided for the appointment of permanent fire wardens, thus keeping those offices outside the domain of politics. Owing to political feeling, the permanent appointment was eliminated, thus changing the original intent of the bill. The text of the bill follows:

AN ACT

To amend and re-enact Act No. 113 of the Session of 1904, approved July 4, 1904, entitled "An act to establish a department of forestry; to provide for its proper administration; to provide for the preservation of the forests of this state and the suppression and prevention of forest fires; to provide for the reforestation of denuded forest lands, and for the proper instruction relative to forestry in the schools of this state; to provide penalties for the violation of this act and for other purposes; to provide for the appointment of deputy forester by the governor; to fix the assessed valuation, for a period of from ten to thirty years, of lands which shall be planted in trees; to create a forest reserve fund and to provide for the payment of all fines, forfeitures and penalties arising under the provisions of this act into said fund."

Section 1. Be it enacted by the General Assembly of the State of Louisiana, That Act No. 113 of the session of 1904, approved July 4, 1904, be amended and re-enacted so as to read as follows:

An act to establish a department of forestry, to provide for its proper administration, to provide for the services of a state forester, to provide for the acceptance of gifts of land by the state forests, and the administration thereof; to provide for the preservation of the forests of the state and the prevention and suppression of forest fires; to provide penalties for the violation of this act, and for other purposes.

Sec. 2. Be it further enacted, etc., That there be and is hereby established a Department of Forestry, to consist of the register of the state land office, who shall be ex-officio forester, and one deputy forester, who shall be a person educated in silviculture, and who shall be appointed and commissioned by the governor, on the recommendation of the conservation commission, for the period of one year at a time; provided, the ex-officio commissioner of forestry shall receive as compensation for the performance of duties imposed on him by this act \$500.00 per annum, payable out of any funds of the state not otherwise provided for, on the warrant of the commissioner of forestry, and an expense fund of \$300.00 per year for traveling and incidental expenses; the deputy forester and such assistants as may be provided, to be paid as hereinafter provided for.

Sec. 3. Be it further enacted, etc., That it shall be the duty of the state forester, provided for in section 1 of this act, under the general supervision of the conservation commission, to have direction of all forest interests and all matters pertaining to forestry within the jurisdiction of the state; take such action as is authorized by law to prevent and extinguish forest fires, and enforce all laws pertaining to forest woodlands and prosecute for any violation of such laws. He shall carry on educational work in the state in the interest of forest preservation by means of correspondence, publication and lectures, especially in the schools of the state. It shall be his duty to co-operate with private timber owners in laying plans for the protection, management

and replacement of forests and in aiding them to form protective associations. It shall be his duty to examine all timbered lands belonging to the state, and report to the conservation commission upon their timber condition and actual value, and also whether some of those lands may not be held as state forest reserves. He shall be responsible for the protection and management of lands donated to or purchased by the state, and of all other lands reserved by the state as state forests. He shall make statistics of forest conditions, or forest resources of the state, the extent for forest injuries, conduct experiments in tree planting and note the effect of forest grazing and turpentineing and along other lines of forest work. He shall prepare an annual report of the progress and conditions of the state work in forestry to the conservation commission and therein recommend plans for improving the state system of forest protection, management and replacement. Whenever it shall be reported to him that any person or persons engaged in a timber business subject to license tax are operating without license, he shall cause the same to be collected according to law.

Sec. 4. Be it further enacted, etc., That the governor of the state is hereby authorized to accept gifts of land to the state to be held, protected and administered by the conservation commission as state forests, and to be used to demonstrate their practical utility for reculture and as breeding places for game. Such gifts must be absolute except for the reservation of all mineral rights, and in no case shall exceed (10) ten per cent. of the area of any parish wherein such lands may be situated. The attorney general is directed to see that all deeds to the state are properly executed and that the titles thereto are free and clear of all encumbrances before the gift is accepted. When any donation exceeding six hundred acres is made, the name of the donor, or any name he may suggest, on the approval of the conservation commission, shall be given such donation, as the designation of such reserve.

Sec. 5. Be it further enacted, etc., That any person that wilfully and negligently sets on fire or causes to be set on fire any wood, brush or grass land not his own, or sets on fire or causes to be set on fire any land belonging to himself and allows such fire to escape to any wood, brush or grass land not his own; and any person that wilfully suffers any fire set by himself to damage any property of another, is guilty of a misdemeanor, and, upon conviction, shall be punished by a fine of not less than \$20.00 nor more than \$300.00, or by imprisonment of not less than ten days nor more than six months, or both such fine and imprisonment. Every person that wilfully or maliciously sets on fire any such wood, brush or grass lands or causes to be set on fire any such wood, brush or grass lands, whereby the property of another is injured or destroyed, shall, upon conviction, be punished by a fine of not less than \$25.00 nor more than \$1,000.00 or by imprisonment for a term of not less than three months nor more than five years, or by both such fine and imprisonment. Any person who shall cause a fire in any wood, brush or grass lands by carelessly, negligently or deliberately dropping a burning match or emptying fire from a pipe, or dropping a lighted cigar or cigarette, or discharging a combustible wad from firearms, or failing to extinguish a camp fire upon leaving it, shall be deemed guilty of setting the forest on fire.

Sec. 6. Be it further enacted, etc., That nothing in this act shall be construed as affecting the right of action for damages. The liability of persons or corporations for all damages shall include the injury to young growth resulting from fires. The damage to young growth shall be calculated as the expense of artificially planting and cultivating such small growth to the point of development at the time when the fire occurred.

Sec. 7. Be it further enacted, etc., That it shall be the duty of all railroad companies operating any railroad through forest lands within this state to keep their right of way cleared of all combustible materials and safely dispose of the same within said limits of said right of way between the fifteenth day of November and fifteenth day of April. No railroad company shall permit its employees to leave a deposit of fire or live coals on its right of way other than between the rails, in the immediate vicinity of woodland or lands liable to overrun by fires, and when engineers, conductors or trainmen discover that fences or other materials along the right of way, or woodland adjacent to the railroad, are burning or in danger from fire they shall report the same promptly at the next telegraph station that they pass. In seasons of drought the railroad companies shall give particular instructions to their section foremen for the prevention and prompt extinguishment of fires originating on its right of way, and they shall cause warning placards furnished by the forest commissioner to be posted at their stations in the vicinity of the forest lands. Any railroad company wilfully violating the requirement of this act shall be deemed guilty of a misdemeanor and be punished by a fine not exceeding one hundred dollars for each offense, and railroad employees wilfully violating the requirements of this section shall be guilty of a misdemeanor and shall be punished by a fine of not less than five dollars nor more than fifty dollars. But this section shall not be construed to prohibit or prevent any railroad company from



PLATE I. EXCELLENT YOUNG STAND OF LONG-
LEAF PINE, WHICH COMPRISES AL-
MOST ONE-HALF OF THE FORESTS OF
LOUISIANA



PLATE II. TYPICAL CYPRESS SWAMP IN THE ALLUVIAL REGION BORDERING THE MISSISSIPPI RIVER IN LOUISIANA



PLATE III. IN THE CYPRESS REGION, A RIDGE TYPE FOREST COMPRISED OF SWEET GUM, WATER AND LIVE OAKS, HACKBERRY AND OTHER HARDWOODS. ALLUVIAL AND BLUFF REGION, WEST OF THE MISSISSIPPI RIVER IN LOUISIANA

piling or keeping upon the right of way cross ties or other material necessary in the operation or maintenance of such railroads.

Sec. 8. Be it further enacted, etc., That in a prosecution for the wilful and negligent setting fire to forests, when the evidence has been heard on the guilt or innocence of the party or parties charged with the crime, it shall be within the discretion of the court to take evidence as to the cost of fighting the fire which the accused is charged with setting, and it shall be within the discretion of the court to assess such costs as a part of the penalty of the person or persons charged, if he shall be found guilty.

Sec. 9. Be it further enacted, etc., That there shall be appointed by the governor, upon the recommendation of the conservation commission, a person practically and theoretically educated in silviculture, who shall be deputy state forester. His duties shall be as herein prescribed for the state forester, and he shall be the chief assistant, under the supervision of the state forester, in carrying out the forest policy of the state. He shall receive a salary of \$1,800.00 per annum, and, under the supervision of the state forester, shall have an allowance not exceeding \$600.00 per year for office and traveling expenses, which shall be paid by the state forester from the conservation fund, established by the law of this state.

Sec. 10. Be it further enacted, etc., That the state forest warden shall prepare notices, printed in large letters upon cloth or strong paper, calling attention to the destruction caused by fires and to the forest fire laws and the penalties for their violation. Such notices shall be distributed to all forest wardens, parish officials, railroad and lumber companies, private citizens, officers, railroad stations, in public squares, along public highways and in other places. Any person who shall maliciously or wilfully destroy, deface, remove or disfigure any sign, poster or warning notice posted under the provision of this act, shall be guilty of a misdemeanor and punishable upon conviction by a fine of not less than fifteen dollars nor more than one hundred dollars, or by imprisonment for a period of not less than ten days nor more than three months, or by both said fine and imprisonment.

Sec. 11. Be it further enacted, etc., That the consent of the state of Louisiana be and is hereby given to the acquisition by the United States by purchase or gift of such land in Louisiana, not exceeding one hundred thousand acres all told, as in the opinion of the federal government may be needed for the establishment of a national forest reserve in this region; provided, that the state shall retain a concurrent jurisdiction with the United States in and over such lands in so far that civil process in all cases and such criminal process as may issue under the authority of the state against any persons charged with a commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this act had not been passed; that power is hereby conferred on congress to pass such laws as it may deem necessary to the acquisition as herein provided for incorporation in said national forest reserve such forest covered or cut-over lands lying in Louisiana as in the opinion of the federal government may be needed; that power is hereby conferred upon congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature and provide punishment for violation thereof, as in its judgment may be necessary for the management, control and protection of such lands as may from time to time be acquired by the United States under the provisions of this act.

Sec. 12. Be it further enacted, etc., That all monies, minus the cost of prosecution, received as penalties provided for the violations of this act, shall be paid into the state treasury and placed to the credit of the conservation fund.

Sec. 13. Be it further enacted, etc., That in order to encourage the practice of forest culture in this state, when the owner or owners of any land which has been denuded of trees or any other land the assessed value of which shall not at the time of application exceed the sum of five dollars per acre, shall contract in writing with the commissioner of forestry to supervise planting and growing upon the said land suitable and useful timber trees in such manner as they shall prescribe, to protect the said land from fires, as far as practical and to maintain the trees so planted or grown upon it in a live and thrifty condition for a period of not less than thirty years and not more than forty years, and to cut or remove from said land within that time no tree or trees except as permitted in the said contract; it shall be lawful for the state board of equalizers, and the assessors of the several parishes, and they are hereby authorized upon the recommendation of the commission of forestry, to fix a valuation of \$1.00 per acre upon said lands and timber, and this valuation to remain fixed and unchangeable for the period of the contract entered into by the land owner aforesaid with the commission of forestry.

Any land owner who has made such a contract with the state shall be entitled to demand an annual inspection by the Chief Forester and a certificate as to whether the contract has been carried out. At the end of the contract entered into by the land owner with the commission of forestry, or at any time within that period that the

owner or owners of said land shall fail to maintain it in all respects according to the written agreement entered into by the owner and upon which the said land was given a fixed assessment for a fixed number of years, the said land shall be restored to the assessment roll and shall be taxed the same as other similar lands, and in addition thereto the said lands shall be supplemented on the assessment rolls for an amount that would equal the assessment of the land had it not been assessed under the provisions of this act. Nothing in this act shall be construed as giving the Forestry Commission jurisdiction over lands of any resident farmer without written contract.

Sec. 14. Be it further enacted, etc., That it is hereby made unlawful for any electric lighting or power company to attach any wires or other lighting appliances to any tree along any street of any town or city in this state, and in towns and cities where such wires and lighting appliances are already attached to trees, the person, firm or corporation owning the same be and they are hereby required to remove the same within ninety days after the approval of this act. Any person, firm or corporation violating any of the provisions of this section shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than twenty-five nor more than one hundred dollars for each and every offense so committed.

Sec. 15. Be it further enacted, etc., That the State Conservation Commission shall have the power to purchase lands in the name of the state suitable for forest culture and reserves at a price which shall not exceed \$1.00 per acre, using for such purpose any surplus money not otherwise appropriated, which may be standing to the credit of the conservation fund; to make rules and regulations governing state reserves.

Sec. 16. Be it further enacted, etc., That the state and parish boards of public education are directed to provide for proper courses of instruction by text-books or lectures on the general subject of forestry of this state; and they are further directed to provide for the celebration by all public schools of Arbor Day, on which day, trees, flowers, etc., are to be placed, where practicable, on the grounds surrounding all public school houses.

Sec. 17. Be it further enacted, etc., That this Act shall take effect on the date of its passage and all laws in conflict herewith are hereby repealed.

The bill above quoted, which was approved July 7, 1910, is what is known as the general forestry bill. Another bill (No. 172) passed the same session refers to the establishment of the conservation commission. This commission, according to law, is to consist of eight members, three of whom are ex-officio, namely the superintendent of experiment stations of Louisiana, the state forester and the chief engineer of the state board of engineers. The other five are appointed by the governor. To this commission is given the supervision of all minerals and forests and the direction of the expenditure of the conservation fund. According to the law its duties shall be to promote and conserve the natural resources of the state. It has an appropriation of \$1,800 per year for expenses.

THE REVENUE BILL

The complete text of the revenue bill which was originally framed by Mr. Foster of the Forest Service but which was greatly changed in form as it went through the legislature is given herewith. The bill has remained inoperative pending court litigation brought by the lumber interests. The final section of the bill, it will be noted, has furnished them with an excuse to hold it up on this technicality. The bill, which was approved July 6, 1910, follows:

AN ACT

To create a conservation fund by levying, collecting and enforcing payment of an annual license tax upon all persons, associations of persons, or business firms and corporations pursuing the business of severing timber and minerals from the soil; and prescribing the mode and method in which said persons subject to license tax shall make report of their business.

Section 1. Be it enacted by the General Assembly of the State of Louisiana, That there is hereby levied an annual license tax for the year 1911, and for each subsequent year, upon each person, association of persons, or business firm or corporation pursuing the business of severing from the soil timber and minerals subject to license under Article 229 of the constitution.

Sec. 2. Be it further enacted, etc., That on the second day of January, 1911, and each subsequent year, each tax collector throughout the state shall begin to collect and shall collect as fast as possible from each of the persons and corporations pursuing within his district or parish the business of severing from the soil timber and minerals, a license tax as hereinafter fixed.

The said tax collectors shall receive for collecting said license tax the same compensation as for collecting other license taxes.

All license taxes collectable under this act shall be due and collectable during the first (2) two months of each year, and all unpaid licenses shall become delinquent on the first day of March of each year, and all firms who commence business after that date shall become delinquent unless the license is paid within two months and ten days.

Sec. 3. Be it further enacted, etc., That the annual license tax for severing timber from the soil shall be fixed as follows on the gross annual cutting:

Par. 1. That for carrying on the business of cutting pine timber for saw logs, or square timber, the license shall be three-fourths of one cent per one thousand feet log scale.

Par. 2. That for carrying on the business of cutting hardwood timber, for saw logs, the license shall be three-fourths of one cent per thousand feet of log scale.

Par. 4. That for carrying on the business of cutting timber for stave bolts, the license shall be one cent per each hundred bolts.

Par. 5. That for carrying on the business of cutting timber for telephone and telegraph poles, and piling the license shall be three-tenths of one cent for each pole and piling, and one cent for each pile.

Par. 6. That for carrying on the business of extracting turpentine from standing trees the license shall be ($\frac{1}{2}$) one-half ($\frac{1}{2}$) of one cent each year for each cup or box.

Sec. 4. Be it further enacted, etc., That every mining company engaged in this state in the business of producing oil, natural gas, sulphur, or salt shall on the first day of February of each year, render to the Secretary of State a report signed and sworn to by the president and secretary, of its annual production in each parish, the total financial receipts in the sale of the annual product, and annual total quantity of the products at the mines or wells in such form as he may require. The tax collector shall demand from each company applying for a license a certificate from the Secretary of the State certifying to the total amount of the product mined in each parish during the preceding year by such company as shown by the sworn statement on file in his office, and the license shall be based upon such certificate.

Sec. 5. Be it further enacted, etc., That each and every company, person, persons, association of persons, or corporation engaged shall pay a license on such business based on the gross annual output as follows, to-wit:

Par. 1. That for the business of carrying on the mining and production of oil the license shall be ($\frac{2}{5}$) two-fifth of one cent on each barrel produced.

Par. 2. That for carrying on the business of mining and producing natural gas, the license shall be ($\frac{1}{5}$) one-fifth of one cent on each ten thousand cubic feet produced.

Par. 3. That for carrying on the business of mining sulphur, the license shall be (2) two cents for each ton mined.

Par. 4. That for carrying on the business of mining salt, the license shall be ($\frac{1}{5}$) one-fifth of one cent on each ton mined.

Sec. 6. Be it further enacted, etc., That the annual cutting of timber or production of minerals, referred to as a basis of license, are those for the year in which the license is granted: the stand and for their estimation shall be prima facie of the preceding year if the business has been conducted previously by the same party or parties, or the party or parties of whom they claim to be successors. If the firm or company be new, the amount of cutting or production for the first two months shall be considered the basis, and six times that amount shall be estimated as the annual cutting or production of such business: providing that any person or company commencing business after the first of July shall pay one-half of the above rates.

Sec. 7. Be it further enacted, etc., That the time and manner of collecting licenses under this act; the method of determining the amount of same, the form of the license receipt; the manner of filing and recording affidavits by the tax collector and rendering accounts to the auditor shall be the same as now provided or may hereafter be provided for the collection of other taxes, except as different provisions are made in this act.

Sec. 8. Be it further enacted, etc., That all monies collected on licenses under the terms of this Act shall be placed in the Treasury to the credit of the "Conservation Fund," which is hereby created.

Sec. 9. Be it further enacted, etc., That this Act shall not go into effect unless and until the proposed amendment to the Constitution of this State, amending Article 229 thereof has been adopted, which amendment is to be submitted to the people as provided by this Legislature.

EDITORIAL

OFFICIAL OBSTRUCTION

SOME of the dangers of bureaucracy in government become evident at times in Washington, although not a general characteristic of our system, in which the various bureaus and departments are, as a rule, responsive to the public will. It becomes possible at times, however, for a bureau to actually override the popular will, as expressed through congress, and a double example of this has appeared in connection with the Appalachian forest legislation.

It was the obvious intention of the House when it passed the Weeks bill in 1910 to appropriate \$11,000,000 for the purchase of land on the watersheds of navigable rivers in the Southern Appalachian and White Mountains. Every step in the debate shows this. The appropriation was distributed over a term of years in order not to make too heavy a draft on any one year's revenue; yet the controller of the treasury, by a decision which takes no account of evident legislative intention, cuts off practically between two and three million dollars of this amount which it is impossible to expend before certain dates. With regard to the one million for 1910 carried by the House bill which was held up in the Senate until 1911, there is some justification for the controller's decision, although the grounds for it are technical, the intent of the bill being plain. But the remaining annual appropriations should have been regarded as continuous. Otherwise, the controller's decision does the country an injury and practically nullifies an act of Congress in this respect, for if the law is beneficial, and Congress decided that by enacting the law, a decision impairing its action impairs a national benefit. On the other hand, if the administration of the law were not in conscientious hands, the decision might lead to hasty and unwise expenditure in order to secure the full appropriation.

Such unlimited power to modify legislation cannot safely be lodged in any one man. If Congress is looking for usurpation of the legislative function, it need not cast its eyes upon the Supreme Court or the President. Here is a subordinate treasury officer who exercises legislative functions.

When the Weeks bill was passed it introduced the Geological Survey as a competent, scientific bureau to act in an advisory capacity in the purchase of land under the act. The plain purpose of the bill was to purchase forest land on the watersheds of navigable streams to the amount of eleven million dollars in five years. It was perfectly well known that the White Mountains of New Hampshire and the Southern Appalachians were the watersheds for securing which the bill was drawn. It became known soon after the passage of the act that the Geological Survey would be very slow and cautious in carrying out its part under the law. The position of the Geological Survey was made clear in a statement of its director given to the press and published last month in this magazine. It is perfectly evident that the exhaustive scientific inquiry therein indicated could not successfully be carried out within the term set for the operation of the law. It cannot be said that the Geological Survey is going beyond the powers conferred upon it by the bill if it chooses to read only the letter of the law and overlook the intent, which was to accomplish results along the proposed lines with sufficient promptness

to avert severe public losses. But thus far the Geological Survey has done practically nothing to meet the plain obligation resting upon it even under its own interpretation.

It is probable that when the law was passed it was supposed that the Survey had at its disposal the necessary information regarding the physiography of these two well-known regions, and that it had experts who could determine by a simple survey with sufficient correctness for all practical purposes the questions involved in so far as the Survey is called upon to determine anything. It is certainly not for the Geological Survey to say what constitutes a navigable river, or on what rivers the watersheds should be taken. The sole question is, will the protection of the watershed indicated by the Secretary of Agriculture affect the navigability of the stream, assuming it to be navigable?

Yet it is possible for the controller of the treasury and the Geological Survey to practically nullify an act of Congress simply by obstruction.

IS FORESTRY PRACTICAL?

IN AN address on practical forestry before the National Lumber Manufacturers' Association, Dr. C. A. Schenck disclaimed knowledge of the exact meaning of practical forestry, even after twenty years' experience as a professional forester. If so able an authority will pardon the criticism, this seems to us to have been an unfortunate admission, although the turn of the phrase doubtless pleased many of the lumbermen present and ingratiated the speaker with a part of his audience.

From our point of view the expressions "practical forestry" and "theoretical forestry" involve an essential fallacy. Forestry, rightly considered, is, in its very nature, a practical or applied science and needs no qualifying adjective. It is in the last analysis the application of scientific principles to the cultivation and management of trees and land. There cannot be any theoretical or unpractical side to real forestry. Probably Dr. Schenck would be prompt to assert this, as his mind is eminently practical. Nevertheless, his remark in opening the address referred to, gave an opportunity for some of the lumber trade journals which, notwithstanding a growing sympathy with forestry, still like to find weak spots in the forester's armor.

There may be unpractical carrying out of forestry teachings, but forestry in its fundamental principles cannot be otherwise than practical; nor are its misapplications either so numerous or so harmful as the wasteful practices of a very large number of lumbermen, which are unpractical even from the crude standpoint of dollars and cents returned. What does it mean when the claim is continually made by individual lumbermen and by lumber journals that their business is conducted at a loss, that the only money made in it is by speculation in timberlands? If that is true, lumbermen as a whole are a most unpractical class.

But is it true? Is it not a fact that those who are conducting their business along systematic lines, who are following more or less the principles of what is coming to be known as scientific business management, are making profits, and that the reckless and wasteful operators are losing? From the standpoint of profits, then, lumbering is no more practical than forestry. It all depends on how it is carried on.

However, this *tu quoque* method of debate would be extremely unprofitable if it did not lead to some conclusion tending to harmonize the difference.

The fact is simply that forestry and lumbering are entirely practical if rightly handled. They have sought different ends, but these ends must be

harmonized for the future good of society. Forestry must be practiced in this country or there will soon be no lumber industry worth mentioning, and the ablest lumbermen see this and acknowledge it. It is a repetition of a well-worn illustration to say that the idea in the past of the lumberman has been to turn the forest into money as the miner turns the product of the mine; a plan which worked well in early days of sparse population and great virgin forests. The idea of the forester is permanent cultivation, forest farming, and this is every year more necessary as population leaps forward and the original virgin forest supply diminishes. The lumberman must turn to the forester for help. The lumbermen of the future will be foresters. The difficulty now is that lumbering is still in the hands of men of the old idea, men with fixed business habits, enterprising, seeking large and quick returns, and willing to expend enormous energy to obtain them. They can be satisfied with nothing less. But the great and quick profits of the old days of lumbering accessible virgin forests are gone with the forests. To these men the methods of forestry are impractical. It is necessary for them to readjust their view and to recognize forests as a resource in the perpetuation and permanent productiveness of which the whole people have an interest that must dominate any private interest.

Then again the markets are not adjusted yet to new conditions. We are the most extravagant users of lumber in the world and we chafe at increased prices. The consumer has a duty in this matter of adjustment that is quite as serious as that of the forester and the lumberman. The general application of forestry will not cheapen lumber products. It will steady the market, but scientific production and intensive cultivation always cost something, and those who look for a return to former low prices of forest products as a result of forestry are doomed to disappointment. The saving must be made through more careful and economical use. Our consumption per capita is the highest of any nation of the world. The consumer must learn to pay the price for good stock and make his saving by more care and restraint in use.

Practical? There is no theory about it at all. It is everyday economics based on cold facts. If forestry ever occupied the realm of theory the advanced practice of other nations has removed it therefrom.

NATION AND STATE—AND ASSOCIATION

IN THE course of recent correspondence in which a writer expressed dissent from the principles of the American Forestry Association, an inquiry as to the reason for this dissent brought out the statement that "the American Forestry Association stands for federal control, whereas we all in this part of the country believe in state control of all natural resources."

To the readers of this magazine it is not necessary to point out the error involved in this statement. It arises from a misconception, both of the attitude of the Association and of the issue involved in the control of natural resources. On the first of these points proof is easy. The attitude of the American Forestry Association has had official expression in resolutions adopted each year at the annual meetings, and especially in the admirable statement of the current year. To say that the American Forestry Association stands for federal control is both true and untrue. The preamble to the resolutions of 1911 states its position very clearly:

"Whereas the American Forestry Association stands distinctly for the agencies, national, state, municipal and private which are working for conservation and perpetual renewal of our forests;" and the fifth paragraph of

the resolution says "that the states should encourage private forestry by extending the facilities for popular information on forestry subjects, by establishing demonstration forests, and especially by improving the system of protection from forest fires and by reforming the laws on forest taxation. That they should inaugurate the policy of buying land and acquiring a perpetual forest cover and of managing such land by the state as an owner with all the rights of an owner. That they should enforce a reasonable degree of regulation on lands where the direct influence of the forest on streams and erosion is clearly proven. That they should put the interpretation of such regulation in the hands of a qualified forester with the power and with sufficient assistance to ensure full enforcement."

This is certainly a clear and explicit statement of the right and the duty of the state to act in the field of forest conservation. The Association assumes no doctrinaire position on this question. Probably among its members varying views are held as to the extent to which federal control should be exercised, but we believe its members in every state in the Union are at one in their desire to find the best solution of all the problems relating to the perpetuation of our forests.

The fact is that the line has been drawn altogether too sharply and definitely between state and federal control in the popular mind by recent discussions which have been carried on with some carelessness as to statement and definition. The general issue is one older than the Constitution, and it can never be settled simply for or against our federal system. Compromises and adjustments, however distasteful to either side, always have had to be made and always will be. It is undoubtedly true that modern means of communication have united states and communities as never before, have brought the states closer together and have nationalized many questions; but the states still remain the units of our political system and in forestry matters the American Forestry Association holds the function of the states to be of the highest value, as the resolution above quoted shows. But it is also true that the boundaries of forests and watersheds do not correspond with those of states, and one state cannot do those things that would injure its neighbor. Thus there is a legitimate field for national action for the common good, as there was when the Louisiana territory was secured by the action of the nation, which created from that territory the state from which our correspondent writes, as a part of the United States.

Furthermore, the nation possesses a great unalienated domain which it has been found necessary to protect from private exploitation in order that the people of all the states may not suffer loss for the profit of a few. Only selfishness can question such an exercise of national control; but to say that the American Forestry Association stands, without qualification or explanation, for federal control is one of those half-truths which is more injurious than a complete misstatement.

STATE FOREST LEGISLATION

THE intelligent activity of state legislatures during the last months in the field of forest legislation promises well for the early development of a nation-wide forest system in which each state will do its part. It indicates an awakened public interest that is not abstract and concerns itself with the immediate home problem. On the Pacific coast, California, Oregon and Washington have all been active during their last legislative sessions. In the middle west Minnesota has adopted a model forest code, published last month in *AMERICAN FORESTRY*, and has organized a forest

service on modern lines under an efficient forester. Wisconsin, which has long stood in the front rank, is working on a series of forestry measures, designed to further enlarge and strengthen the state forest service and to increase the forest property of the state. In the south, Florida has a forest law under consideration, and Louisiana, to which we give some space this month, has adopted an interesting legislative policy, some phases of which still have the gauntlet of the courts to run. In the east, the states that have already shaped forest policies are protecting them at points where weakness has been shown. New Hampshire, in particular, has formulated a very complete forest law which seems to be a model for the conditions to which it applies.

It is not surprising that in all this new legislation, protection from fire is emphasized. The fires of the last year and the active agitation of various associations and individuals, united with the self-interest of the timberland owners, have inevitably forced to the front this most obvious phase of forestry—a phase which has all the pressing urgency of general property protection.

It is equally interesting to note that another subject, confessedly of the first importance, that of forest taxation, is conspicuous by its absence from legislative action. It is a melancholy fact that in all the thousands of years in which human society has been experimenting with various forms of taxation for the support of government, no well-reasoned, scientific system has received general sanction and been put into effect. We have to acknowledge that all our systems of taxation are unscientific makeshifts. The taxation of our forests suffers especially under these conditions, because the forestry question has been so imperfectly understood, and the means of securing a public income from private forest lands that will be at once just to the public and to the private owner, has not presented itself clearly to our lawmakers. It is very difficult to secure a frank and intelligent discussion of this subject. Everybody is willing to talk about it and everyone acknowledges the importance of reaching some intelligent conclusion, but very few are willing to commit themselves definitely to any policy. The whole subject of taxation seems to have its terrors which increase with knowledge.



CURRENT LITERATURE

REVIEWS

Forest Life and Sport in India. By Saint-hill Eardley-Wilmot, C.I.E., late Inspector-General of Forests to the Government of India. Illustrated with photographs by Mabel Eardley-Wilmot. New York: Longmans, Green & Company; London: Edward Arnold. pp. xi, 234. Price, \$3.50 net.

The dedication of this interesting mingling of description, personal experience, and account of Indian forest conditions and the organization of the Indian forest service, is to "Theodore Roosevelt, forester and naturalist, in admiration of his success in the conservation of the natural resources of his country," a fraternal tribute which will give the book a place in the hearts of many Americans. The author joined the Indian forest service in 1873 as a subordinate officer and continued in the service until the end of 1909, rising through the grades to the highest rank, becoming inspector-general in 1903, so that he writes with the authority born of long and intimate experience. The book is in part a personal narrative, which under the circumstances is both entertaining and instructive. The forests of India in all of their varying types are described with the keenness of a man who knows them, not from an occasional excursion or tiger hunt, but from years of residence combined with professional duties which compelled study and knowledge. The organization, methods, and problems of the forest service are also well set forth. The author's long service covered very largely the development of forestry in India and this is brought out in the narrative which opens with his early experiences in the province of Oudh, and closes with his work as inspector-general in improving the conditions of the service which he had worked with for over thirty years.

The concluding chapter contains a warning to England that she must help herself in securing the direct benefit of the forest, showing by a brief survey of conditions in the world's supply and markets that neither from India, Canada, nor other countries can an adequate supply of forest products be expected. The author's observation regarding the object of state forestry in India should be applicable elsewhere. It is, says Mr. Eardley-Wilmot, "to supply the requirements of its popula-

tion in forest products, to protect the water supply of the country, and to afford help in its industrial development. As is the case in European countries the forest management should, as it always has, result in profit, but this profit should be subsidiary to the main objects in view; it should be a consequence of, and not a reason for, a forest policy."

This is a book simply written by a man who has a story of significance to tell; a book to be read by those who wish to know what the world is doing in forestry; a book that graphically describes a phase of Indian life not presented in other books. It is interesting to note the interest in forest sport, the almost affectionate regard even for the tiger developed in the man who has been their neighbor for years and matched his strength against theirs, and the thought, more than once referred to, that the disappearance of the big game would take away one of the attractions of a forester's life in India, and make it harder to recruit the service.

Shade Trees in Towns and Cities. Their selection, planting, and care as applied to the art of street decoration; their diseases and remedies; their municipal control and supervision. By William Solotaroff, B. S., Secretary and Superintendent of the Shade Tree Commission of East Orange, N. J. New York: John Wiley & Sons, 1911. pp. xviii, 287. Price, \$3 net

In reviewing Dr. B. E. Fernow's excellent book on "The Care of Trees" in June, 1910, the remark was made that it filled a long-felt want. Mr. Solotaroff's volume now comes to meet the same need. Dr. Fernow found this work called for as an addendum to his long experience in forestry work; the New Jersey specialist writes from his own intimate study and experience with the care and management of public shade trees. These two books, together with a handsome pamphlet by Colonel William T. Fox, the late superintendent of state forests of New York, and a bulletin published several years ago jointly by the Massachusetts Agricultural Experiment Station and the Massachusetts Forestry Association form, so far as we know, the whole comprehensive literature of the subject. There are, of course, numerous studies of certain phases of it, such

as tree surgery and insect pests. The present volume is a welcome addition to the brief list and should have a wide sale. It is sane, careful, concise, and complete. The opening chapter discusses trees in the life of a city and is followed by chapters on selection of trees for street use; species for street planting; the planting of street trees; the care of street trees; injuries to shade trees and how to protect them; injurious insects, fungous and other diseases; insecticides, fungicides, and spraying; the repair and replacing of trees; who shall plant and care for street trees; a department of municipal arboriculture; and legislation.

Mr. Solotaroff joins Dr. Fernow in a protest against the use of the term "city forester," preferring that of "tree warden." The present reviewer made the same protest years ago against the use of this misnomer. It is something more than a mere question of name. It gives a wrong idea and should be avoided.

The illustrations in this book have been carefully made and selected. They are admirable and tell a great deal of the story well. For the rest it may be said that there seems to be nothing omitted that is really essential, and nothing included that is unnecessary. It is a good thing to be able to say this in these days of many books. If this manual, or Dr. Fernow's, or better both of them are thoroughly studied by those who have in charge the shade trees of our towns and cities, a great improvement in conditions should be attained in a few years. Not those in actual charge of the trees only, but all of those citizens who wish to know the standards to be worked for and the conditions of attaining them, can study such books with profit.

MONTHLY LIST FOR JUNE, 1911

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Canada—Dept. of the interior—Forestry branch. Successful tree planters; letters from all over prairie provinces tell of benefits derived from plantations 37 p. il., pl. Ottawa, 1910.

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Some Reports and Bulletins

The Biennial Report of the State Geologist of North Carolina, Dr. Joseph Hyde Pratt, is to a considerable extent a forestry report, dealing at length with the conditions in the state and work that is being done. On this point the report says that the protection and the perpetuation of the forests of North Carolina has become one of the more important problems and studies of the North Carolina Geological and Economic Survey. It is estimated that approximately eleven million acres of land in the state are now supporting some kind of forest growth and one-half of this area is probably absolutely forest land. Problems relating to forestry are vital to the industrial life of the state, which should put forth every effort to make the forests as nearly perpetual as possible and encourage and stimulate their conservation by their owners. The forestry work of the Department has consisted of: (1) An investigation of the forest conditions of North Carolina; (2) a study of forest fires in North Carolina; (3) a statistical study of the wood-using industries of North Carolina; (4) the examination of timber areas in regard to practicing scientific forestry; (5) examination of watersheds belonging to municipalities in regard to their protection from fire and contamination; (6) investigation regarding the re-forestation of

abandoned farm lands and cut-over lands. This work was conducted by W. W. Ashe until May, 1909, since which time J. S. Holmes, formerly of the United States Forest Service, has been the forester of the state.

The latest issues in the series of studies of wood using industries in the several states cover Kentucky and Oregon. The former is by Roger E. Simmons, statistician of the Forest Service, and is published under the direction of M. C. Rankin, chairman of the state board of agriculture, forestry, and immigration, and commissioner of agriculture, labor, and statistics of the Commonwealth of Kentucky, and H. S. Sackett, chief of the office of wood utilization of the United States Forest Service. The latter is by Howard B. Oakleay of the Forest Service, published under the direction of A. B. Wastell, secretary of the Oregon Conservation Association, and J. B. Knapp of the Forest Service. They are done on the lines of similar studies of other states that have been already noticed in these pages. Both states are of great interest in this connection.

Museum Bulletin 147 of the New York State Museum, issued as Education Department Bulletin No. 490, is the twenty-sixth report of the state entomologist on injurious and other insects of the state of New York and is of interest to tree growers as well as horticulturists. There are a few pages on forest tree insects, including the large black carpenter ant, Abbott's pine sawfly, the spotted cornus sawfly, the blue cornus sawfly, the spotted pine weevil, the snow-white linden moth, the birth leaf skeletonizer, beech tree blight, and silver fir aphid.

The annual report of the State Board of

Forestry of Indiana is a survey the experimental and educational work which is going on in the state. Indiana is having the experience of all of our states and there is proceeding there a slow and patient development of public sentiment. The biennial reports of the state foresters of California and Wisconsin, two states where forestry has already arrived, have also appeared and contain much matter of interest to the student of state forestry, which should mean every American citizen. Another annual report is that of the commissioner of forestry of Rhode Island, and this is largely a practical essay on the management of woodlands by the commissioner, Jesse B. Mowry.

The Forest Club Annual of the University of Nebraska for 1911 is an interesting pamphlet of 119 pages containing numerous articles, many of them illustrated, of more than local interest.

The Biennial Report of the Board of Commissioners of Agriculture and Forestry of Hawaii, for the period ending December 31, 1910, has been received. This report contains 80 pages devoted to the division of forestry and embraces the whole field of forestry, as the territorial forest service, under Mr. Hosmer, is active in all directions. Our continental foresters will envy a department which is able to say that the territory has not had any forest fires of sufficient importance to justify more than passing mention.

The annual Report of the Director of Forestry of the Philippine Islands for the year ending June 30, 1910, is a compact summary of the work of the department, the peculiar problems of which have been discussed in recent articles in AMERICAN FORESTRY.



NATIONAL FOREST WORK

Grazing and Fires in National Forests.

In reply to a letter signed Helena, Montana, published in the *New York Evening Post* of the 25th of May, and full of the usual inaccuracies and threadbare misstatements made so familiar to us through the oratory of Senator Heyburn, Mr. Graves, the Forester, made the following reply, which was published Monday, the 12th of June, 1911.

To the Editor of the Evening Post:

Sir: A letter under the heading "The Cause of Forest Fires," has just come to my attention. Since it was written by a man who speaks as one familiar with western conditions and without bias of personal interest, I fear that readers who are not informed concerning national forest matters may be led to form wrong conclusions. The natural inference from the letter would be that under the present system of national forest administration the annual growth of grass is not utilized, but is allowed to accumulate year after year until its presence, dry and inflammable, becomes the real cause of forest fires.

The letter asks "Why did not these terrible fires occur before the government's preservation system was introduced?" As a matter of fact, they did. The forests themselves furnish conclusive proof, in enormous old burns, that fires quite as terrible as any of recent years were common before the national forests were created. The answer of your correspondent to his own question is, "Because the grass was mostly eaten and not stored up year after year to be used as kindling by some stray spark or burning match," and he speaks of the "persistence" of the government "in storing inconceivably large quantities of dry grass in close proximity to timber." But under national forest administration the annual forage crop is not stored. Last year permits were issued for the grazing of nearly one and one-half million cattle and horses and over seven and one-half million sheep on the national forests.

The Forest Service not only allows grazing, up to the limit set by the necessity of protecting the range itself, the young forest growth, and the flow of streams against the evils of overgrazing; it also seeks to develop the use by stockmen of range which is now unused because of inaccessibility. It recognizes the value of

regulated grazing as a means of fire protection. Instead of closing the forests against stock, as your correspondent's letter would lead one to believe, the Forest Service has steadily and energetically sought to discover methods by which the amount of forage annually produced may be increased, making possible a corresponding increase in the number of stock on the forests. On understocked ranges every effort has been made to increase the number of stock. To open up new ranges roads and trails have been built and favorable freight rates have been sought from railroads. Studies have been made and experiments conducted to learn how the waste of forage due to trampling may be reduced. Reseeding investigations have been made. In short, every effort has been put forth to bring about the fullest use of the range resource consistent with the preservation of this and the forest and water resources.

Opposition to regulated grazing is due as a rule not to restrictions upon the amount of stock allowed, but to the fact that those who use the national forest ranges are not allowed free use, but must pay a moderate charge for the privilege; and to the further fact that as demand for use of the range increases the number of stock which any one man may graze is cut down. The grazing charge is fixed at a rate decidedly below the value of the privilege. As new men enter the business, room is made for them. This is done in order to encourage the settlement and development of the country. Those whose allotments are reduced are, naturally, loath to give way to the newcomers.

HENRY S. GRAVES,

Forester.

Washington, D. C., June 9.

"Care With Fire" Rules

According to a press report of the 5th of June, the California fire season has already begun. Two fires, due to incendiaryism, in Siskiyou County and in Tulare County have been reported. The protection force, which has been greatly increased, has controlled them both and found the person who was responsible for the fire in each case. Incendiaryism is usually due to inflammatory oratory in Washington, but for the simple camper or traveller without wicked intent, the District Forester at

San Francisco has drawn up a set of simple rules. If travellers in the mountains would but observe these rules, the fire record would be less than half as bad as last year, *For sixty-three of the worse forest fires last year were started by hunters and campers.* The "Care with Fire" Rules are as follows:

1. Be sure your match is out before you throw it away.
2. Knock out your pipe ashes or throw your cigar or cigarette stump where there is nothing to catch fire.
3. Don't build a camp fire any larger than is absolutely necessary. Never leave it, even for a short time, without putting it out with water or dirt.
4. Don't build a camp fire against a tree or a log. Build a small one where you can scrape away the needles, leaves or grass from all sides of it.
5. Don't build bonfires. The wind may come up at any time and start a fire you cannot control.
6. If you discover a fire, get word of it to the nearest U. S. Forest Ranger or State Fire Warden just as quickly as you possibly can.

The Wallowa Forest Divided.

For purposes of administration, President Taft has signed a proclamation effective July 1st, establishing the Minan National Forest, Oregon, which has been a part of the Wallowa Forest. The division was made to permit a more efficient fire patrol.

Troops Cannot Be Assigned For Fire Protection.

A resolution has recently passed the California Legislature requesting of Secretary of War Stimson detachments from the regular army, to be stationed in California Forest Reserves during the three fire months, July, August and September, for prevention in fighting forest fires. Secretary Stimson has refused the request, saying that other states would probably ask of him the same privilege, and stating that too many troops would thus be required. The troops may, however, be called out in case of emergency.

The Florida National Forests.

Plans are being laid in the office of Supervisor Eldridge, at Pensacola, Fla., for the improvement of the two national forests in Florida, the Choctawhatchee and the Ocala. These improvements, which will be begun when the apportionment of the fund for District 3 has been made, consist of the building of several ranger stations, barns, wharfs and some sixty-seven miles of telephone lines, which will be constructed through the Choctawhatchee Forest this summer.

Appropriation Allotment for District 4.

The officers in charge of District 4, of the United States Forest Service, with headquarters at Ogden, Utah, have received news from the Washington office that during the fiscal year beginning July 1, 1911, they have an increase of \$70,720 over the allotment of any previous year. The amount for the district for the coming year is \$907,210. Of this the following sums are available for the purposes named:

For supply depot and office of property auditor.....	\$168,320.00
For general administration of District 4.....	738,890.00
(Of this) For the District office	73,590.00
For the administration and protection of thirty national forests is District 4.....	665,300.00
(Of this) For permanent improvements	75,000.00
For forest nurseries.....	34,000.00
For extraordinary emergencies in fighting fire.....	10,000.00
For fire patrol.....	13,297.00

With the liberal provisions made for the protection of the forests, an additional appropriation for the Agricultural Department during the coming fiscal year, a special emergency fund of \$1,000,000 is to be available for fire protection. No allotment of this amount is made to each district, but it will be used as conditions demand and circumstances warrant. The officers in charge feel confident that with such forehanded provision the fire disasters of last year will not be repeated.

STATE WORK

Florida.

A bill introduced by Senator Williams, in the Florida legislature, which is intended to promote conservation of the forests of Florida along the line of the national laws, provides for the establishment of a state forest commission and the conservation of forest resources of the state.

The bill provides for the commission consisting of the governor, the commissioner of agriculture, the director of the state experiment station, the attorney general and the state geologist, which commission shall act without compensation, but shall be reimbursed for actual necessary expenses. It provides also that a state forester shall be appointed by the forest commission who shall be designated fish, game and forest commissioner, and who must be technically trained. He shall have the direction of all matters pertaining to forestry; have charge of all forest wardens; enforce all laws pertaining to forests and woodland and prosecute for any violation thereof; collect data relative to forest destruction and forest conditions; deliver annually a course of lectures at the University of the State of Florida upon forestry and silviculture; carry on an educational course of lectures on forestry at the farmers' institute, act as secretary to the forest commission and prepare an annual report with plans for improving the state system of forest protection, management and replacement.

The state forest commission shall, by this bill, have the power to purchase, in the name of the state, lands suitable for state reserves at a price which shall not exceed one dollar per acre for cut over land and two dollars per acre for any other land.

The governor of the state is authorized to accept gifts of land and the attorney general is directed to inspect the deeds.

If, for any cause, lands revert to the state, the title of these lands shall be permanently vested in the state after a period of two years and shall become, if suitable, a forest reserve.

Strict penalties are in force against every individual or corporation which carelessly, negligently, wilfully, or maliciously sets fires.

Logging and railroad locomotives, donkey or threshing engines, operating in, through, or near a forest, which do not burn oil,

shall be provided with appliances to prevent the escape of fire and sparks.

Upon examination by the commissioner and recommendation of the state commission, state lands suitable for forest growth can be maintained permanently as such.

Pine trees under ten inches in diameter cannot be boxed one foot above the ground. Railroad ties must be cut from trees which are fourteen inches in diameter or more. Cedars cannot be cut less than eight inches in diameter, six inches above the ground.

The forest commission is authorized to regulate the sizes of green timber in the different portions of the state.

The "forest fund" shall be created by a ten-cent stamp which must be affixed to all naval stores.

Manufacturers of lumber must once a month make a sworn statement to the collector of revenues of every thousand feet manufactured and pay to the collector three cents for every thousand feet, the money to be added to the "forest fund" named above.

An appropriation of four thousand dollars annually for each of the fiscal years 1911 and 1912 is made for carrying out the provisions of this act.

Massachusetts

Governor Foss has recently (June 10, 1911) proposed an amendment to the state constitution in regard to taxation, one portion of which is of interest to the readers of AMERICAN FORESTRY. This amendment gives to the general court full power "to prescribe for wild or forest lands such methods of taxation as will develop and conserve the forest resources of the commonwealth." At a hearing on this proposition, Henry James, Jr., spoke for the Massachusetts Forestry Association, and urged the adoption of the amendment which, he said, would give relief to the owners of forest lands during the long growth of new timber when the burden of the present tax is too great for the small owner to bear. Mr. James quoted from the report of the state forester that there are three million acres of waste land in Massachusetts which ought to be covered with forests. Following the plan of Europe these forests should yield a revenue of upwards of \$2.50 an acre, thus a revenue of \$7,500,000 upward would accrue to the state and, Mr. James went on to point out, re-

forestation on such a scale would mean an increase in the water powers of the state of from 100,000 to 300,000 horsepower, another element of profit. Growing timber should be taxed no more than growing corn. The tax should be on the tree when cut, was the substance of the contention. Mr. D. Blakely Hoar, speaking for the Chamber of Commerce, buttressed Mr. James's argument.

New Hampshire.

Early in June the forestry commission of the state met to receive the report of the state forester on the forest fire protection work, started this spring, and to consider plans of future action. The state forester reported that from the 19th of April to the 9th of June, 1911, twelve thousand acres in New Hampshire were burned over. This all happened in the southern part of the state, where celebration of the Massachusetts holiday, the 19th of April, started the conflagration. Ever since that date fire patrol has been maintained and on Sundays the force has been doubled. Each patrolman has put out incipient fires and warned a great number of people, and yet he seems unable to cope with the lawless spirit of the holiday season.

A tract of land of 210 acres in the town of Warner has been given to the state of New Hampshire for a state forest as a memorial to Walter Harriman, governor of the state from 1867 to 1869. The donor is Joseph R. Leeson of Newton, Massachusetts, a son-in-law of Governor Harriman. The land lies on the south slope of Stewart Mink Hill, near the birthplace of Governor Harriman. Stewart Mink, the southern extension of the Mink Hills, is over 1800 feet high, and commands a view of the entire country from the White Mountains on the north to Monadnock on the south.

The reservation will be under the care of the forestry commission and will be used as a demonstration forest. It contains a small area of old growth spruce near the top of the hill and lower down a mixture of spruce, maple, beech and birch, which gradually emerges into a thrifty stand of pure hardwoods containing a large percentage of red oak. The open land is seeding rapidly to spruce and pine. It is proposed to carry on experimental cuttings to improve the present stands of timber and to plant a variety of species on the open land.

In giving this land to the state, Mr. Leeson expressed the hope that it may lead to the acquisition of other tracts, on which the principles of forestry may be demonstrated.

It is much to be desired that the announced name—Walter Harriman Reservation—should substitute the term State Forest for Reservation. The latter term is

a misnomer and is always obnoxious, as was determined in the case of the national forests. State forest, on the other hand, conveys the dignified idea, not of something set apart, but of a useful public domain.

A New York Appointment.

William Gibbs Howard, a graduate of the Harvard Forest School of 1908, has been appointed assistant superintendent of forests of the state of New York. In addition to forestry work in New England, Mr. Howard has had practical experience in the work of the United States Forest Service in the west. He has also a working familiarity with the New York forestry problems gained by nearly two years' work as forester in the Adirondack forest reserve. He has been stationed at Albany for two years.

Washington.

A new forest fire law became effective in the state of Washington early in June, a law so drastic in its provisions that complaint has been made that some of the logging companies may be driven out of business. The new law ranks among the three or four best in the United States except in the matter of appropriation.

For the most part the law represents the conclusions of the commission appointed by Governor Hay. One of the principal changes made in the law was a reduction of the appropriation asked for. The state has now only \$76,000 available for the next two years, although undoubtedly more will be forthcoming if this amount is wisely spent. The following are some of the provisions of the law: The operation of donkey engines is prohibited; logging locomotives must be watched by track patrol; mill waste cannot be burned unless confined; when rights of way are cut for railroads or wagon roads, all the debris must be burned; snags and dead trees shall be cut and disposed of before a slashing fire is set.

These are some of the provisions of the new law which it is said will drive the lumbermen out of business, but the state of Washington had a bad scare last summer when the extensive forests of the western part of the state were threatened. And the legislature, at the instigation of the governor, has come to the belief that forest fires and not preventive measures will drive the lumbermen out of business.

Wisconsin.

Wisconsin has become the synonym for progressive legislation and the three new bills on the subject of conservation which represent the labors of the special joint committee seem to warrant this reputation. The legislature has recently voted:

1. An appropriation of \$250,000 a year for ten years for the purchase of intervening forest land in order to bring the present reserve of 385,000 acres up to 2,000,000 acres.

2. A county fire warden system for the northernmost twenty counties of the state, to be paid for out of a fund of about \$250,000 to be raised by special tax of two cents per acre on all lands to be benefited by the system.

3. A public domain commission to take the place of the present state board of forestry and the fish and game warden department; the state forester as superintendent of the public domain commission to have charge of the bureau of forestry and the bureau of fish and game; the commission to be constituted as is the present forestry board, namely, the president of

the state university, director of the state geological survey, dean of the agricultural college of the state university, the attorney general and one member at large, named by the governor to serve without pay.

The original recommendation of the forestry committee was that of a 2-10 mill tax to be levied on all property in Wisconsin in order to provide a fund of \$600,000 to take care of both the purchase of additional forest reserve land and of the proposed county fire warden system. As arranged in the new bills the forest reserve appropriation is directly from the general fund, but within a few years the lands of the state forest reserve (it is estimated) will be bringing into the treasury of Wisconsin at least two million dollars from the wood-using industries of Wisconsin.

EDUCATION

Colorado College

The Colorado School of Forestry of Colorado College has had a successful year, with an enrollment of thirty-six students in its undergraduate course. A two-year course, leading to Degree of Master of Forestry, open to persons who have already received a Degree, is advertised in the recent Announcement.

The Ranger course which was given last year in coöperation with the Forest Service, until the decision of the attorney general made its discontinuance necessary, will probably be given in the fall by the faculty of the School alone.

The School has been in charge of Prof. P. T. Coolidge, as Director. Mr. E. I. Terry, a graduate of the Harvard School of Forestry, who has had several years' experience in the Forest Service on the national forests, was appointed as an Instructor in Forestry in January.

In accordance with a working plan prepared by the Senior class last spring, conservative lumbering has been in active progress during the last year at Manitou Park, the 10,000-acre tract of yellow pine owned by the School. The results of these operations are the removal of considerable

over-mature timber and the creation of available funds for the expense of instruction in the School.

New Hampshire State College.

J. H. Foster, Assistant Chief of State Co-operation, United States Forest Service, leaves the Service September 1 to take charge of the new department of forestry in New Hampshire State College, provided for by the new forest legislation of this year. Mr. Foster has had a wide experience and is well known through the published results of his studies of forest taxation in New Hampshire and Louisiana.

Biltmore Forest School.

The Biltmore students studied practical forestry in the Atlantic coast pineries, as the guests of the John L. Roper Lumber Company, from May 1 to 10. Then five days were spent in Asheville and Biltmore, after which the school went to Canton, North Carolina, which will be the address of the school until July 15. From that date until August 7 it will be Cadillac, Michigan, and from that until September 27, Marshfield, Oregon.

THE LUMBER INDUSTRY.

The National Lumber Manufacturers' Association.

The ninth annual convention of the National Lumber Manufacturers' Association was held on the 24th and the 25th of May, 1911, in Chicago, with President Hines in the chair. Addresses were made by lumbermen and one by a forester. The elections resulted in Major E. G. Griggs, of Tacoma, Washington, as president, and upon authority of the resolution of the Association, he has moved the manager's office to Tacoma, Washington. The secretary's office remains as before in St. Louis. The following officers were elected: President, E. G. Griggs, Tacoma, Wash.; vice-presidents, R. H. Vansant, Ashland, Ky.; J. D. Conrad, Glenwood, Fla.; R. H. Downman, New Orleans, La.; treasurer, J. A. Freeman, St. Louis, Mo.; secretary, Geo. K. Smith, St. Louis, Mo.; manager, Leonard Bronson, Chicago, Ill.

Resolutions were adopted opposing further reduction of Schedule D (lumber) of the present tariff law; endorsing "Aldrich measure" for national monetary commission; urging adoption and passage of either the Mann bill or the Fordney bill for a merchant marine made necessary by the opening of the Panama Canal; and supporting federal investigation of the fire waste (Joint Resolution H. J. 97), introduced by Congressman Jackson, of Kansas.

An address was made by R. A. Long, an ex-president of the association, and by the retiring president, Edward Hines. Also a report by Leonard Bronson, manager. There followed an address, informal and fragmentary in its nature, by J. A. Freeman, on "European Forestry"; by James A. Emery on "Working Men's Compensation"; by W. B. Townsend, on "The Hardwood Situation"; and also (upon the request of President Hines), "Practical Forestry as it Relates to Hardwood"; Harrington Emerson, on "Principles of Efficiency as Applied to the Lumber Industry"; J. H. Bloedell, on "The Panama Canal—Its Relation to the Lumber Industry of the Pacific Coast"; Robert Fullerton, "Popular Ignorance of the Lumber Industry"; W. E. Gilchrist, "Advertising Lumber vs. Its Substitutes"; A. T. Garrins on "Advertising." There was one address by a forester, Dr. C. A. Schenck, on "Practical Forestry." H. S. Graves, United States Forester, was to have spoken, but was not able to attend the meeting.

The Yellow Pine Manufacturers' Association.

Immediately preceding the National Lumber Manufacturers' Association meeting in Chicago, the Yellow Pine Manufacturers held their meeting in the same city the 23rd of May. President Thompson in his address referred to recent history, to the suits brought before a special federal grand jury and Judge K. M. Landis by the Department of Justice for the purpose of investigating the lumber business in the west in the light of the Sherman anti-trust law; to the testimony taken by Commissioner Robert M. Reynolds, representing the state supreme court of Missouri in the ouster proceedings brought by the attorney general of Missouri against forty-three yellow pine lumbermen; and to the articles upon the "lumber trust" appearing in various magazines and newspapers.

R. A. Long spoke on "An Advertising Campaign for Wooden Paving Blocks" and Charles Keith on "The Labor Situation in the South." It was Mr. Keith's speech in behalf of reciprocity and especially for free lumber that raised a storm of protest from the association. Mr. Keith maintained that the \$1.35 duty on lumber did not protect, for this duty and the fight necessary to maintain it had intensified the belief in the minds of the public that there was a "lumber trust." He favored a resolution to be sent to Congress that would show that the Association was not fighting for the tariff on lumber. In this he was supported by C. M. McDoris.

W. B. Stillwell strenuously opposed the idea of such a resolution, for, he maintained, such action on the part of the Yellow Pine Manufacturers' Association would acknowledge that lumbermen had been wrong in the past. For the agitation for reciprocity Mr. Stillwell blamed certain powerful organizations that wanted free wood-pulp. Others discussed the question, but it was dismissed without action.

American Lumber Trades Congress.

The third meeting of the congress was held in St. Louis on the 23rd of May. The object for which the congress meets is to put before lumbermen a code of trade ethics for the manufacturer, the wholesaler, the retailer and the consumer, to provide for the settlement of disagreements not covered in a purchase contract.

It is the principle of the "square deal," but in the words of its president, it is described as "the square way to treat a man."

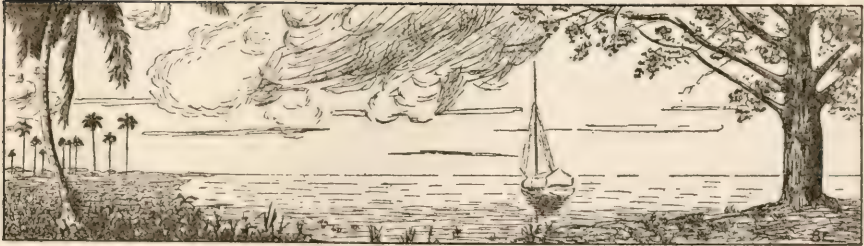
There was much discussion as to the antagonism of the press towards the lumber industry and the reasons therefor. The American Lumber Trades Congress, in its plans for future activities has constituted itself a bureau of information for the lumber industry.

The Interstate Commerce Commission.

Two recent decisions of the Interstate Commerce Commission affect vitally the lumber industry. The first suspends until

the 21st of September the tariffs of trans-continental railroads from Missouri River points to the Pacific Coast, which proposed to advance rates on staves and heading.

The second denied an application filed by the Vicksburg, Shreveport and Pacific Railway for a rehearing in the matter of suspending lumber rate tariffs. According to the lumber journals, this is what happened. Some time ago the Commission refused to suspend these tariffs. The lumber interests asked for a rehearing. Meanwhile the tariffs went into effect. Now, the Commission, through Commissioner Meyer, says that it has no power to suspend tariffs already in effect, and thus the case rests.



NEWS AND NOTES

The Forestry Meeting at Bretton Woods.

The Society for the Protection of New Hampshire Forests makes further announcement of the forest conference to be held at Bretton Woods and the Crawford House in the White Mountains on the 2nd and 3rd of August, in connection with the tenth annual meeting of the Society. At the request of the state forestry commission and of the society, the Governor and Council of New Hampshire have invited the National Forest Reservation Commission to meet at the same time and place. The state forestry commission and the fire wardens of New Hampshire will hold meetings in connection with the conference.

The state foresters of New England and neighboring states have been invited, and the Hon. John W. Weeks, the author of the Weeks bill, and other members of Congress have indicated their expectation to be present.

Headquarters and meetings will be at the Mount Pleasant House, which makes a special rate of \$3.50 per day. Some of the sessions will be held at the Crawford House, which makes the same rate. The Mount Washington Hotel makes a special rate to members of the Society of \$4.50 per day.

On the afternoon of August 1st there will be a trip to the top of Mt. Willard, overlooking Crawford Notch, and on the morning of August 2nd there will be an excursion through the Crawford Notch.

A cordial invitation to this conference is extended to all who are interested.

The Calaveras Trees.

There is a general impression that the national government has purchased the Big Trees of Calaveras, a matter which was agitated vigorously some years ago. As a matter of fact, the law which was passed at that time and which has been very little understood, was unworkable, and nothing has yet been accomplished. The law provided for an exchange with the owner of the Big Trees of unreserved government land on a basis of acreage value. The question has been taken up within a few days in Washington. Judge Raker, the representative from the Calaveras district, who has taken a great interest in the preservation of the Big Trees, arranged a conference between Robert Whiteside, of Duluth, the owner, Chief Forester Graves and Secretary Fisher. Mr. Whiteside is willing to make any reasonable arrangement with the government which will se-

cure him the value of his property, and plans are under consideration for the proposal of new legislation which will be satisfactory to Mr. Whiteside and under which it will be possible to bring the Big Trees into government ownership—a consummation which everyone must regard as most desirable, for these trees are one of the most important historic monuments of the country.

Uniform Forestry Legislation.

Beyond question there is need of uniform forestry legislation in both state and nation. There is, perhaps, less likelihood of unwise legislation being enacted at Washington than in the various state legislatures, for all proposals to Congress are studied and carefully followed by organized foresters and conservationists, while almost any kind of a bill that looks plausible to the lay mind meets little opposition or even discussion by the state law-makers. The subject is crudely understood, at best, by the average citizen or legislator and he experiences a sense of relief when each particular forestry bill is disposed of. Step by step the forestry movement is gaining ground, and as the public mind advances toward a broader knowledge of its possibilities, and its great value to future as well as to present generations, it will be less difficult to secure intelligent action and support from executive and legislative branches of the government and from the public at large. Each state can and should have a forest policy, devised by experts to meet the requirements of each particular state. With broad and intelligent treatment of the subject in each state a basis would be formed which would aid each state in perfecting its own system, and in this way we would gradually reach the ideal. Several states already have fair laws, and in one state a strong committee is at work making a careful study of the laws in other states as well as the requirements in the home state with a view to developing a forest policy that shall be economically and scientifically practical.—*The Lumberman's Review.*

A Correction.

In our June number, in the article on "Insects Injurious to Forest Trees," the legend of the cut at the top of page 339 should have read "Inside of bark worked by western pine beetle," instead of "southern pine beetle" as printed.

"The State as quasi sovereign and representative of the interests of the public has a standing in court to protect the atmosphere, the water, and the forests within its territory

This public interest is omnipresent wherever there is a State, and grows more pressing as population grows

We are of opinion, further, that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs.

The legal conception of the necessary is apt to be confined to somewhat rudimentary wants, and there are benefits from a great river that might escape a lawyer's view.

But the State is not required to submit even to an esthetic analysis. Any analysis may be inadequate.

It finds itself in possession of what all admit to be a great public good, and what it may keep and give no one a reason for its will."

SUPREME COURT OPINION

BY MR. JUSTICE HOLMES ON 6 APRIL, 1908

QUOTED BY

PRESIDENT ROOSEVELT, 13 MAY, 1908, AT WHITE HOUSE



THE UNIVERSITY OF MONTANA AND THE CITY OF MISSOULA

American Forestry

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THE FOREST RANGER

By E. R. JACKSON

PERHAPS the most picturesque figures in all the history of this country of ours are those bold dashing outriders of civilization, the pioneers and frontiersmen like Daniel Boone, Kit Carson and "Buffalo Bill." These men who have led the van of the westward moving army of settlers, going always just a little ahead, their lives just a little more wild and unrestrained than those of their fellow-men. But now with San Francisco just as near to the centers of civilization as Savannah, and Portland, Oregon, no harder to reach than Portland, Maine, we have at last reached a stage of development when our country no longer has any frontier. The tide of civilization, like the flood in the days of Noah, has slowly but surely swept across the continent from sea to sea and engulfed all but a few isolated spots lifted high above the world of man and guarded by Nature by rocky obstructions or impenetrable forests. But a few mountain fastnesses now afford safe retreats to the grizzly and the gray wolf. The savage no longer lurks in the forest to threaten the progress of the immigrant, and 'ere now most of the timbered hillsides have re-echoed with the blow of the ax or trembled at the shock of the miner's blast.

With the passing of the frontier there has gone as well the scout and the frontiersman. Even "Buffalo Bill" and the "Wild West" now suggest to us the stifling heat of a July day, the hustling, jostling crowds of the metropolis, the peanut and balloon venders, the big, free street parade followed by a magnificent performance in the main tent—with utter exhaustion and a feeling of intense relief when it is all over and the children are at last finally tucked away in bed.

So have times changed. The "forty-nine" played his little part in the drama of the West, then yielded the center of the stage to the scout and plainsman. Then came the cowboy, with his jingling spurs, his chaps, his ready gun. But even the cattle ranches, which furnished the setting for the cowman's stage, are now disappearing and in their places the prairies are being dotted with small farms. What then shall the cowboy do when the range has been converted into fruit farms and truck gardens? Will he be compelled to give up the freedom and picturesqueness of his life, to settle down at pulling weeds or drying prunes? Where is there a calling to which he may turn, that he may still preserve the traditions of the Golden West?

But one chance—one hope is left him—the life of the forest ranger. In days to come, when the trapper, the scout, the Indian fighter, even the cowboy are all dim memories, the forest ranger will remain the last embodiment of the Spirit of the West—the link which unites a glorious past to a practical present. Strange it seems to me, that the modern dramatist, who so constantly and eagerly is searching for material for new thrills which he may perpetrate upon the public, has not yet seized upon this bronzed fighter of forest fires as his subject. If I were a prophet, I should not hesitate to prophesy that within a few seasons we shall see some Edson or Faversham drawing upon himself the plaudits of the pit by his rendition of the ranger in some thrilling new play—some melodrama of the West. The forerunners of this drama have already appeared—the novelists have begun their work and already two or three books whose heroes are forest rangers are advertised at the book stalls; while writers in the special feature sections of the Sunday newspapers find in the life of the ranger material for unlimited copy.

To my mind, then, when Congress, on March 3, 1891, empowered the President of the United States to withdraw certain forest lands from settlement, and later in 1897, provided for the administration of these forest lands as national forests, not only was a new policy inaugurated as to the management of the forest resources of the Nation, but incidentally, a means was presented of preserving the fascinating and picturesque life of the pioneer and woodsman; for with the necessity of administering the national forests came the work of the forest ranger.

On January 1, 1911, there were in the United States and its territories, 152 national forests. In direct control of these forests are 140 supervisors; but the men who do the real work—"the men behind the guns" (sometimes literally)—in the national forests are the 1,200 rangers, whose duties we are to discuss for a few moments.

Although perhaps no other subject has been so much before the people of the United States during the last few years as forestry, yet the work of the rangers, and the reasons why we have such a body of men in Uncle Sam's service is perhaps not clearly understood by the average citizen. In a recent article in "Technical World," one writer has said:

"The new profession of forestry' has come to mean to the casual reader a sort of cross between a botanical excursion and a Sunday school picnic. The chief duty of the forest ranger is conceived to be to act as a sort of wet nurse to a lot of pine saplings. And because it is so foreign to American tradition to make a business of saving—rather than making and spending—the man in the street has come to regard forestry as something amateurish and foreign—a newly imported fad ranking with polo and the raising of ringed-tail pheasants as an amusement of the idle rich."

This, perhaps, is somewhat exaggerated, yet it is nevertheless true that in many sections of the country there is a serious misunderstanding both as to the duties imposed on the guardians of the national forests, and as to the real purpose for which these forests are maintained. I shall not have time to go into the latter question in detail—so large a subject requires treatment by itself—but that we may know why the national government has provided for the establishment of the national forests (which will give us the key to the ranger's duties) allow me to quote from the "Use Book," which is the official code of the forest officer:

"The national forests are created to preserve a perpetual supply of timber for home industries, to prevent destruction of the forest cover which regulates

the flow of streams, and to protect local residents from unfair competition in the use of forest and range. They are patrolled and protected at government expense for the benefit of the community and home builder."

And again, from a letter of the Secretary of Agriculture, addressed to the Forester, under date of February 1, 1903:

"In the administration of the forest reserves, it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, not for the temporary benefit of individuals or companies. All the resources of the forest reserves are for *use*, and this use must be brought about in a thoroughly prompt and business-like manner, under such restrictions only as will insure the permanence of these resources."

We see, therefore, that these rangers who patrol the forests, are working for *Us*. It is their duty to see that these vast resources are not merely protected from wanton injury, but that such material as can be used without "waste to the inheritance" is made available for use—not by the monopolistic lumber king, but by the settler and local resident. It is the ranger who transacts the business of the forest, as to permits for the use of wood, or range, with the people of the community, hence it is important that the men who fill this important position be chosen with care. Let us, then, follow a candidate for the job, to see how he secures his position, and what his duties are after he has qualified.

The ranger secures his position by competitive examination under the Civil Service. Local residents are given preference in these examinations, in order to make sure that only men who are familiar with local conditions are employed. The tests are both written and by demonstration. Practical questions only are given and while experience is more desirable than mere book learning, yet the ranger must have sufficient education to be able to make maps and write intelligible reports upon forest business. It is also desirable that he know something about the elements of surveying, timber estimating and forest regulations. It is above all essential, however, that he know how to care for himself and his horses when far away from settlements. It is said that one candidate in reply to a question as to what provisions he would take with him for a three weeks' trip into the mountains in August began his list with twenty pounds of beef, which would probably spoil the second day out. Another, endeavoring to be thoughtful of his horse's welfare, listed 50 pounds of horse feed—when grass is never more succulent or easily found than in the mountain meadows in midsummer. But perhaps the demonstration tests are more important, and here is where our old friends, the cowboys, shine particularly bright, though they may be short indeed on book knowledge. The diamond hitch, the pack, the camp fire or the rifle have no terrors for these men who grow nervous at the feel of the penholder between their fingers. And in the end, the ranger must know more about horses and the wilderness than about books, if he is to be successful. He must show himself to be able-bodied, capable of enduring hard work and even privations. As the "Use Book" perhaps somewhat ironically says, "Invalids seeking light out-of-doors employment need not apply."

If the candidate is successful in passing the examination, he is given a six-months try-out as assistant forest ranger, and if he makes good, and is recommended by the supervisor at the end of this probationary period, he becomes a full-fledged ranger at a salary of \$1,100 a year. The ranger provides his own outfit—horse, saddle and personal equipment. He is now ready to begin his job. He reports to the Supervisor of the Forest to which he is

assigned and is given a regular district to patrol. The 152 national forests, which are located almost exclusively in the West, include a total area of nearly 200 million acres. The average area per ranger is 104,000 acres or approximately 168 square miles. This is necessary because of insufficient funds to provide rangers to make possible a more efficient patrol.

The ranger's work lies almost entirely within the national forests. Seldom may he leave his territory, especially during the dry season when there is danger of fire. There he lives and works, seldom even taking his 15 days annual leave of absence.

It is the policy of the Government to provide the rangers with houses as fast as funds will allow. Many ranger stations have already been built where the ranger may live with his family, if he has a family. But sometimes, when no cabin has been provided, the ranger must build one himself. One ranger has taken advantage of a hollow Big Tree log and within it constructed his cabin. Others provide for themselves substantial cabins, where they may live comfortably in spite of storms and rains and winter snows.

Probably the first duty assigned to the new ranger is to make a trip over "his beat." So he packs his blankets, cooking utensils, shelter tent and other necessary equipment on a patient pack horse, mounts his saddle horse and rides away, to be gone perhaps a week, perhaps a month. Sometimes he goes alone, though occasionally some tourist will be his companion, or frequently in summer, technical assistants may go with him part of the time to make scientific studies in the forest.

The route of the ranger frequently leads him through scenery that is kaleidoscopic in its variation and beauty. His pathway often runs from the lowest gates of some vast canyon, through mountain meadows carpeted with aromatic blossoms that lift bright, communicative faces to greet the solitary passer-by, up along some mountain trail where beetling walls overhang on one side and a sheer precipice threatens on the other, until the uppermost limits of the forest are reached amid the snow-clad summits. Perhaps he may even ascend far above the clouds that hang about the lifted heads of the highest mountains and look out upon a billowy sea of mist illumined by the rays of the sun.

Sometimes the ranger allows his faithful horse to rest and skirts the shores of an Alpine Lake in boat or canoe. One ranger, in Montana, lives almost continually in his canoe, patrolling the shores of a large lake. In winter, the snow may be so deep that travel is impossible except by means of snowshoes and sledge.

But there is more for the ranger to do on his patrol trip than merely ride gaily through the greenwood like some knight of "merrier old England"; invariably he carries with him a hammer and a number of cloth signs warning campers against the danger of allowing their fires to get away from them.

If a sale of timber is contemplated, the ranger must mark the trees that may be cut, taking care to provide for thinning when necessary; for the removal of dying or mature trees where the stand needs to be replaced by young growth; and to get rid of defective trees as much as possible so as to provide room for the better young stand beneath them. If there has been a timber sale, he must see that the debris and brush is cleared up and properly piled so as to prevent the spread of possible fires. And when a still day comes, the brush thus piled is burned, so that it no longer is a menace to the forest. This is often done when snow is on the ground to insure greater safety, since then practically all danger of fire spreading is obviated.

Another task which requires great tact and much practical knowledge





THE FOREST RANGER

PLATE II. TELEPHONE CONSTRUCTION, FLATHEAD NATIONAL FOREST, MONTANA





THE FOREST RANGER

PLATE IV. HOME MAKING. RIO GRANDE NATIONAL FOREST, COLORADO

on the part of the ranger is the examination of claims of settlers within the national forest. If there are lands suited to agricultural purposes within the forests, they may be taken and cultivated just as other lands outside the forest. But, of course, many proposed claims are established, under the allegation of utilizing them for agriculture, when really the purpose is to secure the timber from them. These claims are, of course, rejected in the ranger's report to the supervisor. This perhaps explains why some of the western papers are filled with statements that the ranger is a stumbling block in the path of the western country toward progress and development.

Other users of the forests also come under the supervision of the ranger. Thousands of sheep graze within the forest ranges, but each owner must keep to his assigned territory and not run on a number of animals beyond that allowed in his permit. Cattle, too, are grazed under permit, and the old time war between sheep men and cattle men has been made impossible because the range is divided between them.

Many of the states in which the national forests are located have game laws, and the rangers are made game wardens to enforce these laws. Thus they are given police power to make arrests for illegal killing of game. On the other hand, one of their duties is to kill predatory animals, such as bears, coyotes and bobcats, which prey upon the sheep and other animals of the range. Special assistants are sometimes hired whose sole duty it is to hunt and trap these dangerous animals.

Thus the ranger lives and labors for weeks at a time, pitching his camp at night amid the fragrant pines and spruce trees. Each morning he is early astir, ready for a new day. And after weeks of travel, much of the time alone, he finally emerges from the forest, bronzed and bearded, but ready for whatever has turned up during his absence from headquarters.

But the ranger's life does not consist, as one disappointed novice put it, of merely "riding around under the trees and making outsiders toe the mark." There is hard manual labor to be done. There are stumps to be grubbed out to clear ground for nursery sites and ranger stations; routes for trails must be surveyed, not always over level land at that; and often this must be done in winter, in spite of cold and snow. Much heavy work is sometimes necessary to clear off these trails, which are absolutely necessary in order to make possible rapid travel in the forest in case of fire. The trails are sometimes actually cut from the mountain side.

Then there are bridges to be built across streams if these trails are to be worth anything and access given to valuable timber. These bridges are often temporary only, but sometimes more pretentious structures are erected. These trails and bridges form very valuable permanent improvements, and have added greatly to the value of the property in the national forests, not only by making accessible otherwise inaccessible places, but by reason of the increased facility with which fires may be reached and extinguished. By means of them, also, the sheep and cattle on the forest ranges are enabled to cross dangerous streams in safety.

Another form of permanent improvement in the national forests is the telephone lines that are being installed. They enable the ranger to get quickly into communication with the Supervisor's office if he needs help to fight fire, thus saving many a hard ride. The wires are often strung on the tree trunks, but where no suitable trees are available poles are set. Perhaps nothing has ever been done that renders a more efficient service in prevention of fires than this.

The forest fire furnishes the most strenuous and the most exciting part of the work of the forest ranger. During the hot, dry summer season, he

must be constantly on the watch for this, his arch enemy. Perhaps some still, hot day in Indian Summer, his route carries him to some high point where he can overlook a vast stretch of forest. As he pauses at the highest peak his quick eye detects what at first seems to be a thin rift of cloud far along the side of the mountains. He leaves his horse and clambors to a higher vantage point where he brings his field glass into play, for he must make sure whether this is smoke or mist. Should he misjudge, the consequences might be untold damage on one hand or a long, hard, useless ride on the other. When at last he has satisfied himself that the enemy is really at hand, he hesitates no longer. If he thinks he can cope with the situation alone he proceeds post haste to the site of the fire, and perhaps he may succeed in beating it out with his saddle blanket. Such fires are scarcely deemed worthy of mention in the ranger's diary and report.

But frequently it is not such an easy task, but one in which the ranger requires aid. If a telephone line is close by he calls the supervisor or the nearest ranger station for help, stating the location and extent of the fire. It has been said that the rangers constitute the greatest fire department in the world. But the ranger's equipment consists of no polished engines or towering ladder—it is often nothing more than a mustang pony and a pine bough or his saddle blanket. If the fire is a grass or surface fire in or near the forest, it has been found by experience that it can be fought effectively with the aid of common garden sprinklers, followed by a beating with wet sacks or blankets; shovels, axes, and heavy hose are necessary to combat the fiercer crown fires. A plan is now being adopted of placing boxes of tools such as these at convenient places ready for use when a fire breaks out. Armed with these tools, the fire fighters hasten to the fire and endeavor to check it before it grows too formidable, by cutting a lane or guard in front of its path across which it cannot leap. Sometimes backfiring is necessary, and then the ranger fights fire with fire, so that the two fires meet and die out for want of fuel. The common plan is to dig and scrape trenches around the fire, forcing it to a narrower and narrower front, and taking advantage of streams, trails, slopes, and other topographical features that may assist in checking the onrush of the flames. Not always are the fire fighters successful in checking the flames, but the men of the Forest Service have a remarkable record of efficiency in this respect. The Report of the Forester for 1910, contains the statement that of 3,138 fires reported, 2464 were extinguished by the rangers alone, without additional expense or aid.

A forest fire is a terrible menace. The lives of the rangers are constantly threatened and work under more trying circumstances can hardly be imagined. In the great fires of the Northwest last year, there were revealed heroes who need not blush in the presence of any battle-tried veteran of history. The story of Ranger Pulaski is typical.

Edward C. Pulaski, of Wallace, Idaho, was the ranger in charge of a gang of 40 fire fighters. When they found that the fire had gotten beyond their control Pulaski started to lead them to a place of safety, placing them in single file, himself in the lead. They had not gone far before they seemed to be surrounded by fire. The men grew panicky. Pulaski, himself, says that he saw columns of clear white flame spring up like will-o'-the-wisps, feeding on nothing but air. The smoke was so dense that the men had to hold one another to keep from getting lost. Their leader halted the apparently doomed men, soaked a gunny sack with water and dashed off through the fire and smoke to look for a way of escape. The men gave up hope, convinced that he would never return. But he did return and finally led them to an abandoned mine tunnel into which he ordered them. It seemed like condemning the

men to immediate suffocation. The mine timbers were on fire, and the tunnel was filled with smoke. Pulaski stood at the mouth of the tunnel, with drawn revolver and held the men back. In the gang of 40, there were but few Americans. These helped Pulaski control the the others, most of whom before long were lying on the ground gasping for breath, crying and praying. In five hours, the cave became a mad house. Now and then tortured men would rush upon the indomitable ranger, trying to get past him to the open, only to be hurled back and grimly ordered to lie down with faces close to the ground. That he was able to stand and fight men within and fire without for as long as he did is a miracle and sets a new sandard for American hardihood. At first it was thought that Ranger Pulaski would lose his sight, but prompt treatment in a hospital saved his eyes. Pulaski is a great-grandson of Count Pulaski, the polish exile of Revolutionary fame. He is the oldest male in direct line of descent and inheritor of the title of count—but Pulaski American forest ranger, does not care for that sort of thing.

Through the efforts of such men as Pulaski, the people of the United States are saved each year thousands of acres of valuable timber land that otherwise would be fire swept and worthless. But before fires can be altogether prevented, larger forces of rangers must be provided, and much work done in preparing permanent systems of fire protection. The bleached and deadened tree trunks which cover many a western mountain side are mute witnesses of the tardiness of our Government in giving needed protection to its forests.

It is a big task to think of attempting to reforest these burned areas, yet the Forest Service is making a beginning in this direction. The rangers, along with their other duties, gather each year hundreds of bushels of cones from which the seeds are taken and either sown broadcast or sown in seed beds in nurseries, and the seedlings thus produced, set out on steep slopes, unsuited to agriculture or beneath the chapparal or aspen that cover the burns where forests once stood.

Not much is yet apparent in the way of visible results, but the work is yet in its infancy and, doubtless, before long many a desolate spot will again be brightened and made useful by tree planting. The work of the ranger is a work that looks forward, and these humble servants of Uncle Sam are not easily discouraged. Skilled men are planning the work they do, and the laborers are worthy of their hire.



FORESTRY AND THE UTILIZATION OF LAND

BY FILBERT ROTH

THAT newly cleared land is especially fertile is a fact well known to all farming people in all forested countries. Even the primitive people of India and the island regions of the Pacific have long known this fact and have practiced a simple form of agriculture by clearing (usually by burning) a piece of land, raising a few crops and then abandoning the old and clearing another piece. Even the most wretched sands of the Great Lakes region, of New England, or the South will produce a few crops after the forest has "built them up" to a reasonable degree of fertility.

From this great, wholesale experience, the world over, it follows that the forest not only can exist, and produce timber on lands, too poor for permanent agriculture, but also that it can improve impoverished lands. That this is a most important fact seems clear enough when we consider that less than one-fourth of the land of the United States is improved, that several hundred millions of acres are acknowledged to be non-agricultural and that many millions of acres more have been cleared and tried for farming and have been entirely abandoned and that today, many millions of acres are farmed at a loss, a loss to the poor farmer, a loss to the commonwealth. But this vast area of poor lands and lands in difficult situations represent an enormous capital, a most important, permanent asset. And surely it should be the earnest concern of the nation and the states to learn what is possible and feasible to keep these lands in some form of useful production to keep them habitable and to prevent their becoming useless, hopeless, and unsightly waste, detrimental to the surrounding country and to the state.

Barring the arid lands, it is the forest and forestry alone which have thus far proven of permanent value in keeping our poor lands in satisfactory productive conditions. And if we classify the value or importance of the forest to the nation, on the basis of

supply of timber;
utilization of non-agricultural lands; and
protection of watersheds;

it is perfectly fair to place the utilization of non-agricultural lands second, important as the third item is in our country.

It is clear that this great importance of the forest through the ability to utilize inferior lands, like its great influence on water distribution, is primarily of public importance; a matter of the state and nation and secondarily only one of the individual.

And it is all the more surprising that this feature has not been more emphasized even by writers on forestry matters. This is the more deplorable since our state and national legislatures have thus far refused to consider this importance of the forest and also since forestry has been attacked and successfully so, more from the standpoint of the utilization of lands than from all others combined. In Michigan, for example, we have more than one-fourth of all land in the form of cut and burned-over sandy pinery lands, of



ON THE LÜREBURGER HEATH. NEITHER GRASS NOR
HEATHER AND ONLY TWO HOURS' RIDE FROM
HAMBURG OR BREMEN AND FOUR HOURS FROM
BERLIN



REFORESTATION OF THE HEATH



OAK WOODS NEAR HEILBRONN, WÜRTTEMBERG. IN
DENSELY SETTLED AGRICULTURAL AND WINE
GROWING COUNTRY



SCOTCH PINE NEAR BERLIN. THOUSANDS OF ACRES OF
LARGE FORESTS NEAR THE BUSIEST CITY IN EUROPE.
WHY NOT CLEAR THIS AND FARM? BECAUSE THEY
HAVE TRIED IT AND IT DOES NOT PAY



SPRUCE PLANTATION ON RINGENBURG IN WÜRTTEMBERG, A FARM BELONGING TO THE SAME FAMILY FOR OVER 400 YEARS AND BOUGHT BY THE KING AT OVER \$60 PER ACRE TO REFOREST



SPRUCE WOODS PAY BETTER THAN FARM CROPS. FOREST NEAR OBERNDORF IN BLACK FOREST; 140 YEARS OLD; WORTH OVER \$2,500 PER ACRE FOR THE TIMBER CROP



SPRUCE WOODS IN BADEN BELONGING
TO THE OLD NOBLE FAMILY OF
FÜRSTENBERG



WHAT THE HEATH CAN DO. BEACH
WOODS WITH SOME OAK AND
SPRUCE BELONGING TO THE CITY OF
NELZEN

which several million acres have drifted back into the hands of the state for non-payment of taxes, and of which thousands of acres have been settled and abandoned during the last forty years. The facts in the case are so thoroughly established by sad experience, that everybody knows about the pinery lands and their uselessness for agriculture. But a few interested land dealers and politicians are making money out of the traffic in these poor useless lands.

Theirs is a clear-cut dollar statesmanship which the legislature fully appreciates and the result is that today the state of Michigan sells these lands at about one to two dollars per acre, though they are worth ten dollars for forestry, and that the state established an Immigration Bureau to help along the bad work of advertising these lands.

Michigan is not alone. The Heyburn arguments in Congress are exactly of this same order.

The fact is clearly before our people. We have today in the United States many millions of acres of land which demand attention. We have the choice of allowing them to become waste lands, some of them hopeless, permanent waste, or of having them cared for and preserved or returned to a productive useful condition.

While thus in our country the states and people generally work to clear away the forest, the people of Europe, though they have more and better forests than we, have adopted the motto. Extension and improvement of the forest.

And it is quite a surprise to the traveler to find this extension and restoration of the forest in places where exactly the opposite might be expected.

Thus in Belgium, the most densely populated country in Europe, one sees beautiful forests of beech and spruce and in addition, one finds the state restoring worn out and abandoned sand lands by the thousands of acres and at great expense. These are not sand dunes along the coast, but large areas inland, and some of them only two hours' ride from Antwerp, one of the great markets and shipping places of the world.

Similar conditions occur in Germany. The Lüneburger Heath is a surprise to anyone interested in the material welfare of any country. A district settled before the beginning of our era is largely today an unused waste. It is neither grazing land nor field, sparsely populated, largely deserted. Here, too, the fallacy of "It is needed for agriculture," has borne its bitter fruit and the present and future generations have to expend millions to restore these vast areas to some kind of usefulness, for the experience of centuries has taught Europe that these waste lands are not only a waste but even a menace. They are the haunt and breeding ground of the "undesirable," of poverty, vice, and degradation. And if our politicians in the United States care to see and to learn, they need not go far to find similar conditions already existing here at home.

What the forest can do for just such lands is well illustrated by the fine stands of beech and pine and spruce in the city forest of Nelzen and other places.

In the vicinity of Berlin, one of the large and busy cities of the world, in the midst of the best markets to be found anywhere, we again find the pinery sands making people land-poor, abandoned, and finally restored to the only crop that will be permanent, the forest.

Four hours east of Berlin in the vicinity of Kreutz, in the same great North German plain the government has tried and is now trying every known remedy to aid in the development of the country. Large farms, up to 600 acres and more had gradually degenerated into waste land. The people were leaving the country to find work elsewhere. As a last resort the government

has bought the land from many of these farmers, either the entire farm or part of it. The prices even today range from \$3 per acre up and averaged for the entire forest district only \$8 per acre. The government now pursues two lines: agriculture and forestry. Every inducement is made to settlers, only the better land is turned over to them and easy payments, low rate of interest, long term loans, etc., all tempt the new comer. And yet, it is forestry which alone can cope with the major part of this situation. Thousands of acres are reforested every year.

But the most surprising cases one meets in the densely settled, highly improved and well wooded states of South Germany and in Switzerland. Old farms which have well supported their owners for centuries are converted into spruce woods. Old families who have rented their lands for centuries at fair rentals, find it profitable to quit renting and reforest. All through the well-settled farming parks of Switzerland one sees hundreds of spruce and hardwood plantations set out during the last 60 years. The chief forest inspector of Baden, a man of experience, expressed both his surprise and dissatisfaction at these changes. "When I was a young forest official it was almost a daily affair to have to refuse a *permit to clear* away the forest on certain lands. Today I have to counsel and plead with our people to keep them from planting up good farm lands."

But why is all this? Simply because the farmer is no longer willing to work for nothing and to go without the comforts of life. He considers farming as any other business is considered. Farm good land, where farming pays, and leave the rest to others and to other uses.

To us the lesson of the Old World is most significant. With a scarcity of timber before us; with most of our states now importers of timber at great expense, with food to export and food enough to waste more than we can eat, with all this clearly before us it is an unpardonable fallacy, nay a criminal neglect, that we should go on encouraging the destruction of forests and refuse to encourage their preservation and restoration.



THE STRENUOUS LIFE OF THE FOREST RANGER

GILBERT wrote "The policeman's lot is not a happy one," but the lot of Uncle Sam's forest policemen seems to be both happy and strenuous. What the work of a forest ranger actually means can probably be fully realized only by those who have lived long in the wilderness. The following extract from a narrative of personal experience in the spring of 1911 of two members of the Battlement Mesa National Forest reached *AMERICAN FORESTRY* and is published, because it affords a glimpse into the amount and variety of the work on a national forest to get ready for the busy season.

"The time of most of the men on the Battlement during January, February and March having been almost entirely taken up with grazing business, reseeding and forest investigation work, it became necessary in April to do such repair work on the stations and telephone lines as would put everything in working order for a busy coming field season. We have painting of roofs, ceilings, doors and windows, and oiling of floors to accomplish on two three-room cabins, one at the Park Creek and one at the Big Creek Ranger Station. These stations are located at altitudes of 8,500 and 8,750 feet above sea level, where the snow at this season was from four to five feet deep.

A telephone line 16 miles long connecting these two stations and thence from the Big Creek station to the Supervisor's office at Collbran, Colorado, had to be repaired. The line from the Park Creek to the Big Creek Ranger station traverses a country ranging from 8,500 to 10,000 feet in altitude. This line was in bad condition from the heavy snows in some places, long stretches being down and buried in the snow. We started carrying supplies on our backs and sometimes hauling it on roughly constructed sleds to our stations, early in April. From the lower snow line where we could go with pack horses to the stations is four to five miles, we found that a man could pack only about 50 pounds to a trip on skis, and it would take an entire day to cover the ten miles. We had bedding, food supplies, paint and oil, in five and one gallon cans, telephone wire, brackets, insulators and tools, aggregating 500 pounds per station. By using sleds part of the time we transported the entire load to the station in five days. The sleds were hurriedly constructed and pulled mighty heavy, oftentimes we could not pull them more than a few yards at a time without resting. The snow was generally soft and sometimes sticky enough to make it impossible to move the sleds while on our skis, without stopping to scrape the frozen snow off from the bottom of runners or skis and greasing them with tallow. When Supervisor Lowell saw the sleds and attempted to pull one he remarked that it would have been as well to have used the ranger station stove with the feet down for transporting the load.

When we arrived at the stations ice had to be shoveled off from the shingled roofs so that they would dry for painting. The weather was cold and we found it necessary to heat all paint and oil before applying it to the roof. Before painting was attempted we started out to repair the telephone line on skis, carrying with us the necessary wire, brackets, insulators and tools. One of us is an expert on telephone repairs, but a new beginner on skis. The other one had had considerable experience on skis and as a telephone pole and tree climber. We were three days repairing the 16 miles of line. In several places

AMERICAN FORESTRY

we found it buried in six to ten feet of snow. In most of these places we could pull it out with stretchers attached to a tree or a pole, but in some instances it was frozen in so tight that the wire would break in the pulling operation and it became necessary to leave it buried to be picked up later when the snow goes off, so we had to replace it with new wire at this time. We found repairing telephone line on the skis mighty hard work, especially when it was all up hill. The long down hill slopes on our return to camp after the day's work had been completed, when the wind was our only competitor for speed made us forget all our troubles in climbing the last big hill. Disaster lurks in many places for the novice on skis, as was illustrated by a conversation over the line after it had been repaired, between one of us and the Supervisor. In response to our "Hello," the Supervisor said, "How are you?" The reply came, "One shoulder is knocked down and I have a couple of bog spavins on each leg, caused by an attempt to climb a spruce tree while coasting down a steep hill into Park Creek. Otherwise I am feeling fine." In another place the same man was coming down a steep slope going like the wind. He was loaded with tools and repair paraphernalia and at about the middle of the hill he suddenly struck a high snow bank and all that was left above the snow was his "Hello." Even the other fellow, old skier that he is, struck a bare spot one day in coming down a long grade resulting in a large hole in the soft earth and a broken nose on an otherwise smooth countenance.

At the Anderson Camp Ranger Station, one half way between Park Creek and Big Creek, which is a partially abandoned summer camp with a dirt roof on a three-room cabin and the center room entirely open in front, we found the snow piled high above the cabin, but a space was left about two feet wide between the open front room and the high snow bank. Through this crevice we climbed in and examined the telephone located in the cabin and made an effort to call up the office to test the line, but we found that although we had finished repairing the line it would not work so we separated, one of us going east and one of us west, to find the trouble. We latter found a tree had fallen on the line two miles west of Anderson Camp. After repairing the trouble we returned to the Park Creek Ranger Station.

We had skied all together about 20 miles this day and repaired three miles of badly delapidated line, arriving in camp at 8 P. M., having put in 14 hours for one day's work. We were tired, sure, but with an appetite that could not be beaten and after a good night's rest we were ready for the same stunt again. Our work in repairing this line and painting the cabins has been altogether a strenuous time, but after it was completed we felt fully compensated in the knowledge that the work in our busy time during the coming field season would be carried out with better success and efficiency."





TESTING TELEPHONE LINE AFTER CONSTRUCTING IT



THE WAY THE LINE IS
CONSTRUCTED SOMETIMES



PILING AND BURNING BRUSH
AS A PASTIME

THE FOREST RANGER

REFORESTING BURNS IN CALIFORNIA NATIONAL FORESTS

ALMOST every one in California has heard or read about the devastating forest fires of last summer, but how many have heard of the efforts made by the Secretary of Agriculture to reforest these burns with valuable trees? Yet, hardly had the fires been put out and scarcely had the ashes cooled off, when tree planting was begun. Plans for this work were being made even while the fires were still burning.

A statement recently made by the District Forester in charge of the national forests in California shows that during the year 1910 the Forest Service planted or sowed a total of 2302 acres of land in this State. Of this area 282 acres was planted with 244,581 young trees, while the remainder was sowed with 6274 pounds of tree seed, mostly pine.

The 2,302 acres reforested last year is a small area compared with the total forest burned over, but when one considers the rough country covered, the lack of facilities for transportation, and the difficulty of getting in the trees and supplies, the showing made is quite creditable. In connection with this work 5,608 pounds of tree seed were collected from the forests in California, while over 2,000 pounds were purchased in other states, mostly in Colorado and South Dakota.

Most of the tree seed sowing in the forests of California was done by means of the so-called "seed-spot" method. A small plot of ground, usually 18 to 24 inches square, is dug up with a mattock, spade, or harrow so as to expose and loosen the mineral soil to a depth of several inches. From 12 to 15 seeds are then scattered evenly on this prepared plot and, after being firmed into the ground, they are lightly covered with dirt. These seed spots are located usually eight feet apart, making about 700 spots to the acre. By this method, even if only one seed out of each twelve germinates and grows into a tree, the land is fully reforested.

In many cases the ground was covered with a dense growth of burned chaparral and brush which would soon sprout and crowd out the young seedlings. In order to make the tree sowing a success it was found necessary to cut a certain amount of the brush around each seed spot. In a few cases direct broadcast sowing was tried, the seed being scattered as uniformly as possible over the land. This method is sometimes very successful in the spring, when the melting snow draws the seed into the ground.

No sooner was the sowing and planting work well under way than a serious drawback appeared in the form of numerous squirrels, chipmunks, mice and rats, which came from all directions to feed on the seed so attractively prepared for them. It was remarkable how quickly the animals would learn of the whereabouts of the seed and the distance they would travel to get to this food supply. Burns hundreds and even thousands of acres in extent, with apparently not a sign of an animal on them would suddenly become alive with the little marauders. In a number of instances the animals would sit and wait expectantly until the seed was put into the ground. In some

cases 30 to 70 per cent of the seed was destroyed. One chipmunk was seen to visit 38 seed spots in four minutes. Further planting operations were useless unless some means could be discovered to check these rodents. Accordingly, several methods of treating the seed were tried. First, comparatively harmless solutions were applied to render the seed distasteful to the animals. This did not prove successful, because the rodents would hull the seed and get rid of the shell and the distasteful chemical at the same time. Consequently more deadly poisons were tried, but as yet no really effective means have been discovered of checking the ravages of the rodents. Experimentation along these lines is still being carried on.

The work of reforestation is slow, tedious, and costly. At best it will take many years before the trees now planted grow large enough to be of commercial value for timber. In no business is the old adage more true than in forestry, that "an ounce of prevention is worth a pound of cure." Efficient and adequate protection of the forests from fire, and the regulated cutting of timber are, after all, the most effective means of maintaining a perpetual forest growth. Still, a certain amount of artificial reforestation by planting or sowing will always be extremely important.

USE OF TELEPHONE LINES IN FIGHTING FIRES

IN FIRE fighting a minute may mean millions. To realize the truth of this statement, one has only to inspect a trained fire department, used to guard the lives and property, in any city. Most of us are more or less familiar with their time-saving devices; we have admired the splendid horses taught by months of patient labor, to spring to their places at the sound of the gong; have seen them harnessed to the truck in the time it takes to press a button; observed men drop to their places from the floor above. All this training and expense to save a minute's time in the battle against the fire demon, in a city where man has used his utmost ingenuity to build so as to thwart the ravages of this element.

Compared with such a well organized system, the Forest Service methods seem crude indeed. One man with an ax and shovel guards from one to two hundred thousand acres of timber land, worth from one-half to five million dollars. In the greater part of these forests, nature seems to have invited their destruction by strewing the ground with a carpet of dry leaves and resinous needles, and covering the branches and trunks with moss, that, when dry, burns almost as quickly as gun-powder. For one man to attempt, single-handed, to check a conflagration under such circumstances seems worse than foolhardy; and yet, let it be told to the credit of the tribe who wear the Forest Service badge, that when necessity demands, they pit their strength and cunning against the flames, and sometimes, aided by night dews and bull-dog endurance, win out. The Forest Service records could reveal many such cases of which the public has never heard. It is only when the battle has been lost and the fire becomes a public menace that the matter gets into print.

It is obvious that chances are all against conquering a fire of any magnitude under these conditions; consequently, every human endeavor is used to prevent the starting of such conflagrations. During the dry summer months, a ranger's waking hours are spent in patrolling the routes frequented by travelers, to extinguish neglected camp fires, and in searching his district with



RECONNAISSANCE PARTY CAMP OUT-
FIT, KAIBAB NATIONAL FOREST,
ARIZONA



THE FOREST RANGER

EXPERIMENT STATION, COCONINO
NATIONAL FOREST



RANGERS CONSTRUCTING TELEPHONE LINES,
PLUMAS NATIONAL FOREST, CALIFORNIA



THE FOREST RANGER

RANGER TRACING LINES IN WINTER UNDER
DIFFICULTIES MINNESOTA NATIONAL FOR-
EST

a field glass from some lookout point, to detect the first faint column of smoke that means the beginning of a forest fire.

With so much territory to cover, it is a physical impossibility to have all parts of the district under his supervision at all hours of the day. There will come a time when several fires will start at once. The causes are various; sometimes they are set by lightning from the electrical storms that are common in mountainous country; more often they are due to carelessness of campers or tourists; occasionally they are started wantonly by some person who objects to the arm of the law, as represented by the Forest Ranger, reaching back into the wild places; again, it may be that an unextinguished match, or a spark from a pipe or cigarette is dropped in the dry humus, as the hunter or prospector wanders in places remote from the generally travelled trails. The spark ignites the slow burning duff which smolders, perhaps for days, unseen, the thin smoke being lost in the blue of the spruce tops above it; slowly it burns its way to the resinous roots or mossy trunk of some conifer; the mountain breeze fans it to a flame; it leaps up and seizes upon the dry twigs and the pitch laden foliage; the tree bursts into a pillar of flame and the destruction of the growth of centuries begins. Any of these events may happen any day during the long drouth of summer. When they do occur, the ranger needs help and needs it quickly, to save the heritage he has been set to guard.

If he has a telephone, the call for help will be in at headquarters within an hour, and in another the ranger will be at the fire planning his battle and doing all he can to check the flames. At headquarters the organization that has been perfected for just such emergencies is set to work; by telephone the nearest rangers are sent to his aid; from the lists that have been prepared and kept on file of the available men and horses that can be hired at the nearest settlement, crews and supply trains are organized within a few hours and sent in, if additional help is needed.

With no telephone in his district the ranger must ride to the nearest settlement where he gathers such help and supplies as possible, with the least loss of time and returns to the fire after sending a messenger on to headquarters with the news. But, in the meantime, hours have been lost that may mean thousands to the Nation. I have seen seven million feet of timber burn in one afternoon, because a privately owned telephone line on the national forest was out of repair in just such an emergency as has been described. Several hours were lost in getting a messenger out to the nearest ranger and the news to headquarters; a crew was organized and sent in without loss of time, but arrived four hours after the fire had broken out of control of the ranger and the few men he had gathered. In this short time it swept the whole mountain side clean. The supervisor bought that telephone line before another season opened.

While the principal reason for building these lines is for fire protection, they pay for themselves in other ways by facilitating the business and administration of the forest. Hardly a week passes but the ranger finds it necessary to communicate with his supervisor upon some matter of business. Mail routes are scarce in these remote districts. To get to headquarters he may have to ride one hundred miles, or even more. This means several days of labor lost, to say nothing of the risk of leaving the district without any patrol. With a telephone the matter can be settled in fifteen minutes and the ranger does not leave his work.

During the summer months the forests are used to pasture thousands of head of sheep, cattle, and horses, that are trailed for scores of miles to these summer pastures. The telephone is a boon to the owner in enabling him to keep in touch with his foremen and outfit.

This is why the Forest Service spends thousands of dollars of its appropriation each year in the construction of telephone lines. Besides those built and owned by the Service, they have the free use of many miles of telephone built by settlers in coöperation with the Service. Free right of way and poles are granted to any company, corporation, or private party to cross the forests with such lines; in exchange for these privileges the Forest Service asks the right to connect its lines, or to place an instrument where needed. Settlers and miners are glad to have an instrument placed in their cabins free of charge, the only fee required being that they notify the rangers of any smoke seen in their vicinity. Ofttimes an abandoned telephone line, that has been built into a once prosperous mining camp, is purchased or leased at small expense. Temporary lines are often strung to some lookout point where the instrument is placed in a box and nailed to a tree; such lines are generally strung on trees or brush and taken down when the season is over.

A comprehensive plan for a telephone system has been worked out for each forest; few of these have been completed to date, but something is being added to them each year as appropriations are available. With their completion, and an increased force for patrol during the dry season, a serious forest fire on the national forest will be a rare occurrence.



THE APPALACHIAN FOREST

The following is a statement recently issued by the President of the National Forest Reservation Commission in regard to the work of the Commission, and in regard to the authorization for the purchase of the tract of timberland in Georgia:

June 29, 1911.

THE NATIONAL FOREST RESERVATION COMMISSION has authorized the purchase of a tract of about 31,000 acres of land lying in Fannin, Union, Lumpkin and Gilmore counties in the state of Georgia. The tract is located on the watershed of the Toccoa River, which, after uniting with the Hiwassee River, flows into the Tennessee. The report of the Geological Survey shows that it is a very important tributary, having in mind the purpose of conserving the stream flow. The tract of land which it is proposed to purchase is covered with virgin forest, consisting largely of chestnut, oak, poplar, white pine, maple, locust and black gum. It is a mountainous tract, ranging in elevation from 2,000 to 3,000 feet above sea level, in the heart of the Southern Appalachian Mountains. The Commission is unanimous in considering that it is a tract which is admirably suited to fulfill the purposes for which the law was enacted.

The National Forest Reservation Commission consists of the Secretaries of War, Interior, and Agriculture, Senators Gallinger of New Hampshire, and Smith of Maryland, and Representatives Hawley of Oregon and Lee of Georgia. The board has been proceeding with extreme care in making selection of the tracts of forest to be first purchased, realizing the importance which such purchases will serve in fixing the policy of the Commission for the future. It is therefore selecting only such lands as from their location and character, will directly tend to conserve the navigability of navigable rivers, and which may also serve as the nucleus of any pressure to enter into haphazard or improvident selections, but will proceed with extreme care to lay the foundation of what is intended to create a series of forest reserves in such locations and of such character as will carry out the clear intention of Congress.

The Act under which the board is proceeding was not passed until March 1, 1911, and the board has been acting with the utmost diligence upon all of the tracts which have been presented to them, according to the statute, by the Bureau of Forestry and the Geological Survey. Three members of the board have visited personally the tract in question. Both the Bureau of Forestry and the Geological Survey strongly recommended the present tract as fulfilling all of the characteristics required by the statute; and the scientific demonstration made by the Geological Survey of the importance of the stream flow out of the tract in question upon the navigability of the Tennessee River was very clear and cogent.

Many other tracts, both in the southern and northern Appalachians, including certain tracts in the White Mountains, are now under investigation by the Forestry Bureau and the Geological Survey, and as soon as reports are made by those bodies the Forest Commission will proceed to their consideration.

In view of the magnitude of the enterprise which is being thus begun, the board does not propose to pay any speculative or high prices for lands and will not purchase any land which will not conduce directly to the purposes of the Act. This is necessary not merely on grounds of sound policy and economy, but is also made necessary on constitutional grounds, as the Act under which the Commission was created is based upon the power of the Federal Government to regulate commerce and protect the navigability of streams.

FORESTRY IN THE AMERICAN TROPICS

By JOHN GIFFORD.

IT SEEMS to me that forestry shorn of mathematics and theory is the growing of trees primarily for fine lumber. Except in a few places devoid of wood of any kind, it is a mistake to plant trees for fuel wood alone. Not only sawlogs, but sawlogs of such quality that they will bring the very highest price on the market should be the aim of foresters. Fuel wood we have in excess and soft coal is so abundant and so cheap that stock in a soft coal company at the present time is a very poor investment. In the major portion of this country under normal conditions the limbage and waste ought supply all fuel demands.

It certainly does not pay to hire expensive men to look after cheap stuff on cheap land. A dollar is simply a token for a certain amount of human effort, and although in Europe materials are carefully conserved, there is a woeful waste of human labor. We waste materials, but we certainly save effort by the use of labor-saving machinery and up-to-date tools.

There are economic laws that govern development, and I think it is safe to say that agriculture and forestry must develop hand in hand. In other words, there must be a rural population. The cheapness and abundance of land is due, of course, to a sparseness of population in the country. Our census gives us little hope. Were it not for the incoming tide from elsewhere our rural population would decidedly decrease and land would decrease in value accordingly. The newcomers who settle in the country hardly offset the drift to the cities.

I have been interested of late in the handling of lands and in keeping tab on the prices of land throughout the South, including the West Indies. I have been impressed with one thing—the ridiculous price that much of it sells for regardless of what covers it. I will give but one instance of many letters which I have received in reply to advertisements in local papers: 160 acres, 70 acres in cultivation, 40 acres pasture, balance in fine oak timber; one six-room house, one three-room house, two hen houses, a granery, smoke house, seed house, cow shed, a shop, two good barns, 300 bearing fruit trees and vineyard, near to church and school, rural mail delivery and telephone; fine water and a very healthy locality. Price, \$1,000; on easy terms.

You will naturally say, just as I have said many times, that there must be something wrong. A careful investigation will show that in nine cases out of ten the old neighbors have gone to the towns, the newcomers are not liked, or rather not understood, and the children are dissatisfied.

We may hope for change in time, but time is the important element. Unfortunately, good growth is usually slow growth. This discourages private enterprise and is the main reason for governmental control of a certain part of our forested area. After ten years of experience in the American tropics I have unlearned much that was laboriously taught me in school and have come to the lamentable conclusion that our knowledge of tropical American trees from a silvicultural standpoint is so meager that it hardly counts.

Foresters have collected data relating to fifty or more forest trees of the North for many years, but of the three hundred or more forest trees of the tropics practically nothing is known except their names and the names only imperfectly known.

For the bulk of our timber supply we must depend on private commercial enterprise, but as yet, in the major portion of our country, the return, considering the risks, is not sufficient to tempt capital. A paltry return of five per cent or ten per cent does not satisfy the common run of investors; in fact, a return of twenty-five per cent or more is what is expected and what many tropical ventures yield.

I have always worked on the theory that for forestry one should select regions where there are the largest number of growing days, other things being equal. We should also select those species which grow with the greatest rapidity, provided they yield good wood. I know of no forestry proposition, for instance, that would yield a larger return than growing eucalyptus in Pinar del Rio for tobacco poles. The growing of fuel wood, or even tobacco poles, however, does not appeal to me from a forestry standpoint. I would prefer to grow a wood which yields lumber fit for constructive purposes.

As to location many of our best regions, such as rich inland valleys in the tropics, are inaccessible. In South Florida and the West Indies, however, there are vast areas within comparatively easy access of the markets of the world.

In the matter of forestry, the political lines separating one country from another, cut a small figure.

Every forester, in fact every person interested in forestry, should plant a few acres of trees and care for them properly. It is easy to talk about and easy to write about, and I am sorry to say that too few foresters actually own forest land. There is nothing like bringing a proposition home for close and careful inspection.

Of the quick growing trees of the world yielding timber of the highest class, is the great order *Meliaceae*. It is to this order that mahogany belongs and, although much of it is not mahogany from a botanical standpoint, it sells as well, and sometimes better, than the wood of *Swietenia*, the true mahogany. The trees to which I refer either belong to the genus *Cedrela* or are closely allied to it. There is *Cedrela fissiles* of Brazil and Paraguay called *Acajou*; *C. Toona*, the toon or red cedar of the East Indies and Australia and *Cedrela odorata*, the Cigar Box Cedar of the West Indies. The latter seems to exist in three distinct varieties, at least commercially, *cedro blanco*, *cedro hembra colorado* and *cedro macho*. *Cedro macho* or even *cedro hembra colorado* sell under the name of mahogany. These trees grow quickly, on soils of almost any nature, and so far I have succeeded in reproducing them from cuttings. I have a *Cedrela* in my yard which has grown from a cutting at the rate of more than two feet per month. The cutting was put in the ground in March and the accompanying photo of this tree was taken during the latter part of September. It is therefore only six months old from the time the cutting was stuck in the ground. The cutting was not much larger than a lead pencil. Of course, the cool weather will check its growth and something may happen to it, but if it continues to grow at this rate it will soon afford ample shade and many cuttings for further plantings. Fashion may change, since it was not long ago that they were trying to grow crooked oak for the British navy; but these woods of the mahogany group have stood the test of time and have always brought a high price irrespective of the price of other woods.

I have never tried to figure on the return from a plantation of *Cedrela*. In forestry, as in other things, I find it never pays to count your chickens before they are hatched, and I fear that is too often the case with foresters and the promoters of enterprises in general. I think it is safe to say, however, that a *Cedrela* plantation, close to good transportation, ought to yield as much, if not more, than any tree I know of.

Marden says that *Cedrela australis*, which is practically the same as *Cedrela toona*, "is, without doubt, the most valuable timber produced in New South Wales." It is used for carriage building mainly, but has many other uses, of course. It is by far the most popular tree with the foresters of the part of Australia where it grows.

There are other genera of the great order *Meliaceae* in Australia with which I am experimenting. One in particular, the Australian Rosewood (*Dysoxylon Fraserianum*) is of the mahogany class and, although as yet but slightly used, it will come to us some day as a high-priced cabinet wood. It is still cheap in Australia, but according to one forest officer, "the virtues of rosewood cannot be overrated." Another forest officer says, "there is a tremendous future for this wood and it is worthy of careful nursing and protection, more especially as red cedar (meaning *Cedrela australis*) is now nearly extinct."

It may be a mistake to pin oneself to one species or one order of woods, but where their number is legion there is little else to do.

Closely related to these *Cedrelas* is the genus *Quarea*. *Quarea trichiliodes*, the guaraguao of Porto Rico, is a valuable tree with wood very similar to *Cedrela*, but devoid of the cedary aroma. This cedary aroma is supposed to keep insects out of cigars. There are several species of the genus *Trichilia* and a dozen or more little known species of *Cedrela*.

In South America, especially the region bordering on the Carribean Sea, there are still other genera.

This group of probably fifty or more species is all that could be desired from a silvicultural standpoint. They are quick growers, great seed producers (not small seeds like the eucalypts and melaleucas which blow away or which the ants devour) and free from disease. The wood they yield is fit for the very finest cabinet work, carriages, furniture, boards and shingles. Even the small limbs may be cut into shingles. The value of lumber anyway up to date is mainly the labor which has actually been put into it. The stumpage value, including the land, is ridiculously low—low because land is plentiful and people few.

I might add in conclusion that all planters in the tropics must take into account that a hurricane comes now and then which blows the weaklings flat to the ground and strips some of the stronger trees bare of leaves. While I write (October 17) the barometer is low and the tall straight Australian pines, which were made to withstand the gales, are bending and swaying like whips.



A CEDRELA SIX MONTHS OLD FROM A CUTTING
SOUTH FLORIDA



A RANGER STATION ON THE
LOLC NATIONAL FOREST



A GROUP OF RANGERS AND INSTRUCTORS. UNI-
VERSITY OF MONTANA. SHORT COURSE FOR-
ESTRY CLASS, 1911

FOREST SCHOOLS OF THE UNITED STATES

I.

THE UNIVERSITY OF MONTANA

By J. E. KIRKWOOD, PH. D.

ASSISTANT PROFESSOR OF BOTANY AND FORESTRY

THE University of Montana is at Missoula in the western part of the state. Missoula is on the main line of the Northern Pacific Railroad, and the newly constructed transcontinental line of the Chicago, Milwaukee and Puget Sound Railroad also passes through the city. Missoula lies at the mouth of the famous Bitter Root Valley and near the main range of the Bitter Root Mountains, which form for the most part the western boundary of the state. Northward as the crow flies is Flathead Lake, 55 miles away, and eastward it is 72 miles to the summit of the continental divide near the head of the Blackfoot River.

The altitude of Missoula is about 3,200 feet. Its climate is pleasant, not subject to extremes of heat or cold, and its annual rainfall amounts to about 18 inches. The location is healthful, and the natural environment attractive in its plains, mountains and forests, its lakes and streams.

Natural environment is of undoubted importance in the location of a forestry school, and in this respect the University of Montana is well situated. On all sides the hills are clothed with timber, some near and others more remote, but good stands of timber are in the immediate vicinity of the university. A great diversity of condition prevails, which affords opportunity for the study of forest ecology in its various phases. Extensive tracts of young growth show different conditions of reproduction. The timber of the immediate region is mainly western yellow pine and lodgepole pine, western larch and Douglas spruce. In the region tributary to Missoula, within a radius of 75 miles of the city, occur sixteen species of conifers. Besides those mentioned above are the western white pine (*P. monticola*) and the two subalpine species the white-bark and limber pines. There are also Engelmann spruce and Lyall's larch, the western and black hemlocks, the lowland and alpine firs, the arbor vitae, and the Rocky Mountain and common junipers. The western yew also occurs in shrubby form. The hardwoods, so called, are not of much importance, the largest and most abundant of these being the black cottonwood and the aspen, sharing the stream bottoms with a smaller growth of choke cherry, hawthornes, birches, alders and willows.

The timber of western Montana is largely reserved in the national forests. The boundaries of the Missoula, the Lolo, and the Bitter Root National Forests are within a few miles of Missoula, and these and several others including the Deer Lodge, the Flathead and the Lewis and Clark are easily reached by rail or stage.

The proximity of the national forests is a distinct advantage. Likewise the fact that the main administrative offices of District No. 1 are in the city of Missoula. These circumstances bring the work of the United States Forest

Service to the convenient observation of the student. The administration of the national forests is a matter of importance to every student of forestry in this country, and especially inasmuch as the greater number of students ultimately find their employment in the Forest Service. On the national Forests may be seen extensive timber-sales managed on silvicultural principles, nursery work and field planting, improvements, the operations of forces engaged in forest protection, in the elimination of agricultural lands, etc. In addition to these are the enormous logging and milling plants of private interests.

The environment of the University of Montana offers rare facilities to the student whose work is to be with the Forest Service. Western life and conditions are essentially different from those of other parts of the country. The West is vast and much of it sparsely settled. The state of Montana itself extends 650 miles from east to west, and 275 or more from north to south. There are large tracts of wilderness into which not even a trail penetrates. Far removed from the settlements the forester must often find his work, and the man inexperienced in woodcraft is not likely to prove efficient in the discharge of his duties under such circumstances. There is frequently a vast difference between the theoretically desirable and the practical, between ideally correct silvicultural treatment and the character of treatment necessitated by local conditions, and which will be necessitated for many years to come in western forestry. Moreover one needs to understand the people, the settlers, whose interests are bound up more or less intimately with the administration of the forest reserves. Taking all these things into consideration, the matter of experience under western conditions is by no means a negligible quantity. It is rather a necessary asset in the equipment of the western forester.

It is now two years since instruction in forestry was begun in the University of Montana. Two general courses are now offered. A four years' undergraduate course is given in the fundamentals of an education in forestry. At the outset facilities are such that it is deemed impracticable to give a full technical course. The work as planned designs to prepare the student to such an extent that he may be able to finish at one of the larger eastern schools with a year of study of some of the more strictly technical branches. The scope of the work will be broadened, doubtless, in the near future. As at present outlined the four years' course gives a thorough grounding in the subjects of mathematics and engineering, physics, geology, mineralogy, chemistry, botany, and zoology. It includes the study of modern languages, history and political economy. Instruction is also given in dendrology, silviculture, wood technology, and forest pathology.

An important feature of instruction in forestry at the University of Montana is the winter school for rangers in the Forest Service. In 1910 the course was first organized, instruction beginning in January with an enrollment of 50 men. These men were detailed to take the course and came from various parts of District 1 from Michigan to Washington. Owing to the ruling from Washington, D. C., relative to the status of rangers while in attendance at institutions of learning, many of the men were obliged to discontinue and return to their homes. A reasonable number, however, finished the course at their own expense. In 1911 the three months' course was again offered, with the result that 30 students registered (about double the number completing the course the first year), and most of these at a sacrifice of salary in addition to considerable incidental expense.

Thus the results justified the establishment of the ranger school and its usefulness is made evident. As at first organized the course included the

subjects of dendrology, silviculture, geology, mineralogy, surveying, mathematics, mensuration, timber-sales, lumbering, planting, and grazing as required work, with elective courses in chemistry, physics and botany.

In recognition of the need of more extended instruction in several of the branches, and of the introduction of others, the ranger course has been expanded to cover six months (two winters). This plan will be put into effect next winter. There will still be the same opportunity for those who can give but one season to the work, but those who wish to return for a second winter will find additional courses to meet their demands. The subject of lumbering will be divided into descriptive lumbering, forest products other than lumber, and lumbering engineering; additional work will be given in surveying, mapping and drafting; botany will be taught from the systematic and ecological standpoint, preparing men especially for work in connection with grazing and grazing reconnaissance. Courses will be given in forest pathology, in forest management, and in public land laws.

In addition to the four years' course and the ranger school, the university seeks to extend its usefulness to men who are unable to register as resident students. To a limited extent correspondence courses are offered in dendrology, silviculture, mineralogy, surveying and mathematics. This work is designed chiefly for rangers in the Forest Service, who have not time or means to attend the university.

A summer forestry cruise from the university has been announced. This is designed as a tour of the Pacific Coast primarily for the study of the relation between silviculture and practical lumbering. To this work about six weeks' time is given, devoted largely to observation of large logging and milling operations in the regions traversed.



A FOREST SERVICE TIMBER DEAL

ONE of the largest deals in timber in the history of the United States Forest Service is at present well under way, and the outlook for an early consummation of the sale of approximately 600,000,000 feet, board measure, of standing timber is extremely bright.

Application for this timber was made by the Navajo Development Co., a corporation chartered under the laws of Arizona; a careful examination of the area has just been completed by representatives of the company and of the Forest Service.

The tract is located in the eastern part of Arizona, comprising a large portion of the Sitgreaves and Apache National Forests, and is estimated to contain for cutting approximately 575,000,000 feet of western yellow pine, 15,000,000 feet of Douglas fir, 6,500,000 feet of white fir, 1,500,000 feet of Engelmann spruce, 1,000,000 feet of Mexican white pine, and 1,000,000 feet of blue spruce and corkbark fir, board measure, of saw and tie timber, log scale.

The western yellow pine is frequently known as "western white pine," and possesses many of the qualities contained by the white pine of the north woods, the lumber manufactured from it is light and soft, but has considerable strength; the upper grades are much in demand for manufacture into finishing stock, flooring and ceiling, sashes and doors, etc. The clear stock is highly prized by pattern makers, and the entire output of this class of material of one manufacturer is sold to one of the principal transcontinental railway lines for use in making patterns in its shops.

Douglas fir is excellent for mine and other timber, and certain railroads pay more for cross ties manufactured from this class of material than for those made from other species, owing to the fact that they last much longer in the ground. Many thousands of cross ties are made annually in the Southwest, from white fir and the other species mentioned.

The timber is located about 60 miles south of Holbrook, Arizona, the county seat of Navajo County, situated on the main line of the Atchison, Topeka and Santa Fe R. R. from Chicago to the Coast. From this point a railroad will probably be constructed south to the timber, passing in the vicinity of several small towns and through a section containing much agricultural land, a good portion of which can be irrigated by means of driven wells.

All of the cost of railroad construction will not have to be borne by the lumber operations, since by making the road a common carrier, yearly many thousands of tons of freight, now handled by slow, cumbersome freight wagons, would be hauled on the new line. Large quantities of hay, grain and other supplies, all of which must be shipped into the region, are consumed yearly in the small towns and at Fort Apache, an important military post, located about 20 miles south of the tract. In addition, considerable revenue will be obtained from passenger traffic, since, besides civilian travel, several movements of cavalry troopers and their horses to and from Fort Apache are made annually.

Large deposits of coal, said to be of excellent coking quality, exist within 30 miles of the timber. The development of these deposits only awaits a railroad to the vicinity.

It has been the policy of the Forest Service in the past to limit the time allowed for completing the cut contracted for in sales to five years. But in order to protect the investment required in undertaking such a large scale as the one proposed, this period is evidently too short. Therefore, ten years will be allowed in which to complete the contract, beginning at the time of completion of the railroad and sawmill, for which two years additional time will be allowed.

The minimum price which will be considered is \$2.50 per M. ft. B. M. for the first five years of the contract and \$3.00 per M. ft. B. M. for the last five years.

The tract contains what is probably the finest large body of timber remaining in the Southwest, and is located on a large plateau, well watered, with almost ideal logging conditions. The ground is smooth, level or gently undulating, enabling logging to be done at minimum cost, while owing to the favorable topography spur tracks can be constructed very cheaply.

The stand of timber is heavy, and the quality is excellent, assuring a large percentage of upper grade lumber.

The major conditions of the contract as proposed are: All timber to be cut will be marked for cutting, by the forest officer in charge. All timber will be scaled by Scribner Rule, Decimal C. The purchaser will co-operate in fire protection by assisting in fighting fire and by disposing of the debris of logging as directed by the officer in charge. Dead and marked green trees which are a fire menace will be felled. Free special use permits will be granted for the construction of necessary railroads, telephone lines, sawmills, camps, commissaries, etc. The Government reserves the right to turpentine any of the timber included in this sale, the turpentine not to interfere in any way with the logging operations.

These regulations are those which have been in effect in timber sales made by the Forest Service during the last five years.

A deposit of \$10,000 is required with all bids and the successful bidder must give a bond of \$50,000.

A sample contract showing the provisions in detail together with further information and regulations governing sale, can be obtained upon application to the District Forester, Albuquerque, New Mexico, within whose jurisdiction the sale lies.

Taken altogether this is one of the most attractive propositions to be found in the Southwest, not only from the point of view of the lumberman, but also from that of persons interested in opening up and developing new regions. Yet this can hardly be called a new region, since settlement has been going on for many years, and will undoubtedly be stimulated by the building of a railroad to reach the timber under consideration. At the present time tens of thousands of cattle, sheep and horses graze in the region, yet all beef, mutton, wood and other products must be driven on the hoof to Holbrook, for shipment, or else freighted by wagon, over distances varying from 30 to 100 miles.

Besides the timber involved in this case, other large bodies aggregating one and one-half billion feet, board measure, will be made accessible by means of the proposed railroad.

EDITORIAL

THE POLLUTION OF RIVERS AND HARBORS

OF THE evil and uncivilized things done by our modern civilization there are few that have so little excuse as the pollution of streams and coast waters with sewage. Hardly a river that has large cities near its banks runs pure and uncontaminated. Many of them are a stench in the nostrils and an offence to men when they should carry health, pleasure and beauty in their course.

Undoubtedly the rapid growth of urban population makes the disposal of sewage a problem of some difficulty, but if modern chemistry and physics are unable to solve it, sanitary science is a failure.

Filth and slime where cleanliness and purity should be; sources of disease in an element that should be a powerful aid to health; an offence to the senses when they should find joy and satisfaction—that is the condition today of many of the rivers in thickly settled portions of the country and of some of our harbors.

New York harbor is offensive at certain times of year because of careless disposal of the enormous quantities of garbage and also of the emptying of sewers into its waters. Gorged with the waste of the city, the harbor has at last refused to take care of the accumulation and conditions threaten the welfare of the metropolis.

The Merrimac River, receiving year after year the mill waste and communal sewage from the cities along its banks, has become polluted beyond the point of safety, not to mention comfort. Yet here is a stream that is fed by waters of exceptional purity, following a course that would maintain that purity if human intelligence would give attention to its protection.

We stand very much in need of careful study of our streams and their relation to the life along their banks, a study that shall be scientific, comprehensive and practical. When our river systems are thus studied we shall come to know these water courses as a great gift of nature to be guarded and improved, not insulted and defiled. In this protection and improvement, the part played by the forest will be recognized and forests, properly located upon the watersheds, will be recognized as a part of the system, just as they now are on the watersheds of the well-regulated municipal water supplies.

GETTING AT WORK

NATURALLY, in view of the great and widespread public interest in the Appalachian forests and the long struggle to secure national legislation looking toward their preservation, the working of that legislation now that it is on the statute books is watched with intense interest by many people in many states. The Forest Service, as soon as it became evident that the Weeks bill would probably become a law made ready an efficient field and office force to do its part in carrying out the law and work was begun immediately

after the enactment. Unquestionably this was primarily a Forest Service problem.

But there were two other agencies involved besides the Forest Service, which was the active representative of the Secretary of Agriculture. These were the National Forest Reservation Commission, created by the act to be the final authority in land purchases, and the Geological Survey, which because of its staff of scientific experts and its fund of topographical, geological, and hydrographical data was relied upon to be especially qualified to report upon the relation of forests to the flow of the navigable streams, whose watersheds might be recommended for purchase by the Secretary of Agriculture.

The Commission took up its work with commendable interest, even the one commissioner, Representative Hawley, who had been an opponent of the bill in the House, putting aside his prejudices and giving himself with interest and intelligence to the task assigned him. We are glad to be able to say this because we criticised, and not unreasonably, Speaker Cannon's appointment of Mr. Hawley on the Commission.

It became known, however, within a very few days that the Geological Survey was doing nothing. Interviews with the Director by various persons developed the fact that he took very seriously the responsibility of his bureau under the law and proposed to act with great deliberation and thoroughness. His first statement to the public when criticism of his known or supposed attitude became vigorous and insistent, was published in *AMERICAN FORESTRY* in June. However impatient of delay the friends of the law might be, the expressed intention of the Director to use proper care and scientific thoroughness in carrying out the part assigned to the Survey would certainly not be fairly open to criticism.

It was felt, however, and justly, that inaction was not justifiable. If the Survey felt so strongly its responsibility under the law, it should have been ready to act promptly upon its passage for the life of the law is limited and time is an essential factor in the contract with the people.

It must be said frankly that the Survey has been slow in getting into action. Much was said at first of the need of topographical maps of the regions involved. As these have all been mapped by the Survey, new mapping is certainly not needed for the purposes of this law. In the water supply records of the hydrographic division the Survey has more data in regard to stream flow than it can assemble during the life of this act, and it is conceded that such observations require a long term of years to be of real scientific value. To experts accustomed to judging geological conditions, the soil examination in districts so well known and so amply reported upon as the White Mountains and Southern Appalachians should be a comparatively simple matter. Nor does it seem that the practical purposes of this law call for nice technicalities or elaborate and involved research. The question is one of trained judgment applied to visible conditions.

With the question of navigability of streams we cannot see that the Survey has anything to do. That is largely a matter of legal interpretation and rests entirely with the Secretary of Agriculture and the National Forest Reservation Commission.

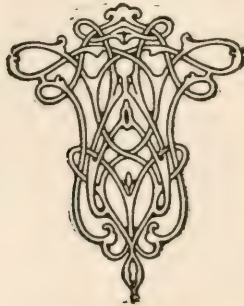
On the 22nd of June in reply to numerous newspaper criticisms, Secretary Fisher of the Interior Department issued a brief statement endorsing the course of the Director of the Survey, the substance of this being that the action of the Survey could not be perfunctory. June 23rd the Director of the Survey gave out a second statement to the Boston newspapers, explaining his position at length. This statement was an eminently temperate one, in view of the criticism to which its author had been subjected, but it was chiefly

interesting because of its assurances which promise progress, if lived up to. The Director said that not much, if any, topographic work will be needed in the White Mountains. It will be gratifying to all New Englanders to read the following "My purpose in the White Mountains is to make the most careful investigation there in order to get what I am very anxious to secure; that is the data on which I may base what I wish to present, a favorable report for the consideration of the Commission."

The Director further declared that geologists would go into the mountains early in July and this has been done. The Director has been invited to attend the forestry meeting at Bretton Woods, where many of the leading friends of the Appalachian movement will foregather. It is to be hoped that he will be there. It will bring about a better understanding and we hope that from this conference complete harmony will result, and that cordial co-operation of the official agencies for carrying out the new law may be looked for during the remainder of its term.

If Congress during this, or the next session, restores to the appropriation the three million dollars lost through technicalities, and this should be easily accomplished in view of the conservative manner in which the law is being administered, and if the Geological Survey interests itself heartily in securing results, another year may see the friends of this great public measure much more cheerful than they have been for some time, or are now.

There is a natural tendency on the part of men whose life is devoted largely to scientific research to see that side of a project of this kind, but we are compelled to look at it as a great practical measure under which results must be accomplished at the earliest possible time in order that they may be as productive as possible of benefit.



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NATIONAL FOREST WORK

President Taft Makes Changes in National Forests

A number of changes in the national forests of California, Oregon, Idaho, and Wyoming, made in the interest of more convenient and economical administration and especially of better protection against fire, have just been announced. These changes have been accomplished by President Taft through a series of proclamations signed at different times in June, but all becoming effective July 1. The proclamations were drawn so as to dovetail into one another, with the result that taken all together they substitute twenty-six national forests for a former seventeen.

The only increase in area is in California, in which two small additions, involving a total of a little over 17,000 acres, are made. On the other hand the proclamations eliminate a total of nearly 242,000 acres, as follows: 85,000 acres in California, nearly 126,000 acres in Oregon, about 6,000 acres in Idaho, and about 25,000 acres in Wyoming. Thus the rearrangement which puts twenty-six national forests in place of seventeen is accomplished by a neat reduction in area of 225,000 acres. It is explained by officials of the U. S. Department of Agriculture that last summer's fire experience in the Northwest made it clear that many of the forest supervisors were in charge of units which were too large for efficient administration. The changes are a part of a general movement to develop, with the aid of last year's experience, the most efficient system of fire protection possible at the present time.

In Idaho the Clearwater, Coeur d'Alene, and Nezperce National Forests were reduced by the establishment of two new units, to be known as the Selway and St. Joe National Forests, with headquarters at Kooskia and St. Marie, Idaho. This was brought about as follows: From the Coeur d'Alene to the St. Joe there was transferred 810,200 acres; from the Clearwater to the St. Joe, 223,300 acres; to the Selway, 1,684,860 acres; to the Nezperce, 16,640 acres, and from the Nezperce to the Selway, 117,140 acres. There was eliminated from the Nezperce several small tracts aggregating 5,920 acres, which upon examination were found to be non-forest land.

In Wyoming the Bonneville was divided into three national forests. The former Sweetwater Division, the southern portion

of the Bonneville, embracing 393,950 acres, becomes the Washakie Forest, with headquarters at Lander; the Green River Division, the central portion of the forest, embracing 577,850 acres, becomes the Bridger, with headquarters at Pinedale; and the northern portion of the forest, embracing 631,270 retains the name of Bonneville, with headquarters at Dubois. Eliminations aggregating 24,936 acres were made from the Bonneville; 2,564 acres from the southern division; 14,175 acres from the central division, and 8,197 acres from the northern division. These areas consist of small tracts lying along the borders of the forest which upon examination were found to be non-forest lands.

In California changes were made affecting the Klamath National Forest, as follows: A total addition to the Klamath of 3,480 acres of forest land; an elimination of 85,000 acres in various small tracts consisting principally of alienated lands lying along the eastern border of the forest; two small transfers from the Siskiyou and the Crater forests to the Klamath; and a transfer of 352,000 acres of land from the Klamath to the Siskiyou, embracing all of the Smith River drainage lying within the forest. In connection with the latter transfer, 13,755 acres of valuable timber land located within the state of California were added to the Siskiyou National Forest.

In Oregon changes were made in the Cascade, Chelan, Crater, Deschutes, Fremont, Malheur, Oregon, Siskiyou, Umpqua, Wallowa, Whitman, and Umatilla forests and the new Minam. Ochoco, Okanogan, Paulina and Santiam forests were established from transfers from the other forests mentioned. Transfers occurred as follows: From the Umpqua to the Cascade, 168,508 acres; from the Cascade to the Santiam, 216,821 acres, to the Deschutes, 504,864 acres, and to the Paulina, 147,720 acres; from the Chelan to the Okanogan, 1,732,820 acres; from the Crater, 9,200 acres to the Klamath, and 61,370 acres to the Paulina; to the Deschutes 174,130 acres from the Oregon, 504,864 acres from the Cascade, and from the Deschutes 699,720 acres to the Ochoco and 407,120 acres to the Paulina; from the Fremont to the Paulina, 411,000 acres; to the Malheur from the Umatilla 179,550 acres, from the Malheur to the Ochoco 119,310 acres; from the Oregon to the Santiam 493,349 acres, to the Deschutes 174,130 acres, from the Siskiyou to the Crater 12,400

acres, to the Siskiyou from the Klamath 352,000 acres in connection with which were added 13,755 acres to the Siskiyou; from the Umpqua to the Cascade 168,503 acres, to the Paulina 306,149 acres; from the Wallowa to the Minam 448,330 acres; from the Whitman to the Umatilla 276,170 acres; and from the Umatilla to the Malheur 179,550 acres, to the Umatilla from the Whitman 276,170 acres. Eliminations from the forests in Oregon occurred as follows: 320 acres of patented land from the Chelan, 27,931 acres from the Crater, 32,935 acres from the Deschutes, 10,606 acres from the Oregon, 9,610 acres from the Siskiyou, and 44,414 acres from the Umpqua. The lands embraced within these eliminations consist of many small bodies lying along the borders of the various forests which upon examination were found to be non-forest lands or patented lands that could well be excluded from the forests.

Seed Collecting on the Kaibab

Since the coniferous trees growing on the national forests do not as a rule reproduce themselves from sprouts, all nursery work, planting and sowing in this district, must begin with the seed. Until there is seed nothing can be done in the way of reforestation. A large quantity of seed economically collected is therefore the foundation of all subsequent work.

CONDITIONS FOR COLLECTIONS.

Ideal collecting aims at obtaining the largest quantity of seed in the shortest possible time and at the least cost per pound, using the funds available for the purpose. It is evident, therefore, that the best collecting can be accomplished only when there is a full seed crop. It is possible to find a few cones every year. At intervals of two or three years, a species will produce an unusually heavy crop. "Seed years" and "off years" and general and alternate in case of Yellow Pine and Douglas Fir, thus 1907 and 1909 were good years for Douglas Fir while 1906 and 1908 were good years for Yellow Pine. The seed crop from the forester's standpoint is not abundant unless the supply of cones is sufficient to make seed collecting profitable. Forest officers occasionally report good seed crops when this is not the case. Frequently poor crops are reported when collecting could be well done with profit. A careful examination of extensive bodies of timber is necessary to determine the abundance of the seed crop and also to determine the best localities for collecting. During "off years" cones are much more liable to be affected by insects than during good seed years. It is, however, always necessary to examine them before arrangements for collecting have been completed. This can readily be done by peeling off the scales with a sharp knife, cutting toward the

apex of the cone. The fertility of the seed can also be determined in this way. If an abundance of cones of good quality are found in a given locality, collecting becomes a question mainly of *time, method and organization*. Seed collecting consists in gathering the cones as soon as the seed is ripe, in drying them out so as to release the seed, and in cleaning and storing the seed for use.

TIME FOR COLLECTIONS.

Before proceeding with the details of collecting, it is necessary to find out when the seed is ripe. This is more difficult than one would think. Cones of the same species ripen first at the lower altitudes. The external appearance of the cones seems to indicate very little. It is necessary to open them as above stated and to examine the seed itself. As long as the seed is soft and milky, it is still immature. It is considered safe to commence collecting as soon as the squirrels begin to store the cones for food, about September 1. Heavy frosts, followed by warm days, materially hasten the ripening of the cones and consequently lessens the time during which collecting from the trees can take place. It is readily seen, if seed is ripe on September 1, and the cones open by September 15, that the period of collecting is necessarily short. For this reason it is imperative *that the equipment be obtained early in fall, that the work be organized on a scale sufficiently large and that it be expedited in every way possible so that it will be completed before the cones open, and before disagreeable weather makes drying difficult or impossible.*

METHODS OF COLLECTING.

There are three methods of collecting cones (a) from felled trees, (b) from standing trees, (c) from squirrels' caches. In places where timber scales are in operation and a species, the seed of which is desired, is being logged at the right time, and a sufficient number of trees are out, it may be preferable to follow the cutters and to pick out the cones from the felled trees or from the ground after the brush has been piled. Where no cutting is done and no easier method of collecting can be found, it will be necessary for the collectors to climb trees. In that case the more limby trees are generally selected and the cones are picked and stripped off by hand. The limbs may also be lopped off, and the branches snapped off by means of hooks fastened to poles. In several instances, special trees have been cut down for the sale of their cones supply. This, however, is not desirable unless the trees bear an unusually large quantity and unless they can be spared and profitably disposed of. Picking from standing trees at best is difficult and expensive. Cones can easily be obtained economically by robbing the

caches of the pine squirrels, since they usually store large quantities. As would be expected the better caches generally occur in the denser stands of timber. They are found along small streams and springy places, in water and muck. Dry caches are frequently found under bushes, trees, tops, and rotten logs. Caches are sometimes covered with humus and are so carefully concealed that it is difficult for the inexperienced to locate them. The squirrels' trails to and from the caches frequently help in locating their stores.

When extensive collecting is undertaken, it is often possible to use several or all of the above methods of obtaining cones. Collecting from squirrels' caches, however, has proven most satisfactory. It has this important advantage, that it can be carried on after the cones on the trees are open and collecting from standing trees becomes impossible.

In the fall of 1907, 610 bushels of Lodgepole Pine cones were collected from squirrels' caches on the Targhee National Forest at an average cost of 18 cents a bushel, one man picking $13\frac{1}{2}$ bushels a day. During the fall of 1908, 1,137 bushels of Yellow Pine cones were collected in the Boise National Forest by the same method after the cones on the trees had opened. In these cases collecting by any other method would have been considerably more expensive.

DRYING THE CONES.

During collecting the cones are usually picked into buckets or baskets, sacked and transported to a place convenient for drying. They are then spread thinly upon canvas sheets or wagon covers and allowed to dry in the sun. If the drying is liable to be continued until the soil becomes cold and wet, it is advisable to prepare a raised platform upon which to spread the canvas. The cones should be spread out thinly upon the sheets. After being exposed to the heat of the sun for a few days, they generally open and allow the seed to drop upon the sheets. The rate of drying depends upon the weather and upon the species. Yellow Pine, Douglas Fir and Englemann Spruce open readily while Lodgepole Pine opens with the greatest difficulty. It is therefore generally necessary to dry the latter species by artificial heat inside a building, or, even better, to collect the cones in quantity in fall and to store them till the following summer when they can readily be dried in the sun.

If the other species mentioned are collected early and good drying weather prevails, it is hardly necessary or advisable to dry them by artificial heat, unless the work is unduly delayed or the weather unusually favorable. It then becomes necessary with all species to resort to the slower and more expensive artificial drying. If artificial drying becomes necessary, a suitable building should be selected or constructed and

provided with tiers of trays arranged around the inside of the room, 8" to 10" apart. The trays should be constructed with screen bottoms having a $\frac{1}{4}$ " mesh through which the seed can drop upon a canvas sheet on the floor of the building. After the trays are filled with cones, one or more stoves are heated up so as to keep the temperature of the room 120° to 140° until the cones have opened up. Partial ventilation of the room to carry off the moisture-laden air is necessary to obtain the best results. When the cones have opened they are removed from the trays and thrashed out, and another supply of cones is then put into the trays.

Twelve square feet of drying space is usually allowed to a bushel of cones. Some of the cones usually open more readily than others. An occasional stirring by means of an iron rake will result in a more even drying. Sorting opened from closed cones is not advisable unless cones are placed too thickly upon the sheets.

EXTRACTING THE SEED.

In case of Yellow Pine a thorough raking of the open cones is generally sufficient to dislodge all the seed. *In Douglas Fir and several other species all of the seed cannot be removed without more violent jarring.* Severe jarring is usually accomplished through a "cone shaker." Such a device may be constructed from a large, strong dry goods box, about 4 by 3 by 3 feet. It is provided at one end with a door made of slats so spaced as to permit only the closed cones to fall through. This door should be fitted, also, with a removable wire screen of such sized mesh as to permit only the seed to escape. Any suitable size of cylinder or box may be used for this purpose. It should be built on a pole as an axis and swung between two trees, or mounted on a windlass frame. A crank should be attached to one end of the axis in order to revolve the apparatus and jar the seed loose. Slats may be nailed lengthwise inside the apparatus, or loose blocks of wood included with the cones, to increase the jarring effect. After the seed has escaped, the screen should be removed and the churning continued to separate the closed cones from the larger sized open ones. The closed cones can then be returned for further drying. While jarring with most species is necessary, trampling the cones is considered too severe and liable to injure the seed.

EXTRACTING THE SEED.

When the seed is separated from the cones it usually contains light membranous wings, broken cones, scales, twigs and other foreign matter which may in part be removed by a large meshed screen. The wings can be broken from the seed by rubbing between the hands or placing it in loosely tied sacks which are then kneaded

or rolled on the floor. The seed can be cleaned by carefully pouring it from one box to another in a current of air. A grain fanning mill fitted with screens of different size is preferable, however, and should be used whenever available. In obtaining clean seed of good quality, it is often necessary to blow away what appears to be good seed, but what is actually worthless. The final process of cleaning can often be greatly facilitated if the cones have been screened before drying begins. In this way needles and other foreign matter can be removed at the start.

YIELD OF SEED.

The yield depends upon the quality of the cones, upon the drying and upon the extraction and cleaning of the seed. Douglas Fir should yield $1\frac{1}{4}$ pounds of clean seed to the bushel. Yellow Pine has frequently yielded as high as 2 pounds to the bushel. If a smaller yield is obtained, it is an indication either that the cones are of inferior quality or that extraction is incomplete. In the case of Lodgepole Pine and Englemann Spruce a yield larger than 1 pound to the bushel can hardly be expected. It is generally less.

SHIPPING AND STORING.

Seed is usually shipped by express. In preparing it for shipment it is placed in strong sacks enclosed in boxes or crates. Labels with the following information should be placed inside the sacks: Species, name of forest, elevation, date and total cost per pound. The boxes or crates should be carefully marked with their destination. Seed should not be kept in a heated room for any length of time. A cool dry place like an unheated cellar or basement is best. To prevent loss by mice, it is usually necessary to hang the sacks from a ceiling by means of hooks or wires.

Past experience in collecting shows that the work has most invariably been started too late. *The best results can only be obtained by planning and arranging the work early in the season, by organizing it on a scale sufficiently large and by prosecuting the work with all possible energy so as to complete it while the weather is still good and before the slow and expensive artificial drying becomes necessary.*

Fire Supervision on the Deerlodge

The scheme of using per diem guards will be given a very thorough try-out this season. Men recommended for such positions should, in every case, be reliable, responsible citizens of the community and have, if possible, at their disposal and under their direction a number of men who can be used as the whole or nucleus of a fire-fighting crew. Each ranger should make it his immediate duty to secure the consent of such men in his district to serve

in the capacity of per diem guards and should send into the Anaconda Office, as soon as possible, the name of each man recommended for the position, stating his full name, postoffice address, business, the number of men controlled by him who can be put immediately in the field in case of fire, how he can most quickly be notified in case of fire, his location in or near the forest, together with any other information bearing on the question. As a rule, from three to five such appointees on each district appears to be a desirable number. They should, of course, be distributed over the district as advantageously as possible under the circumstances. The authority of such men will be limited to the handling of fire protection and no other administrative duties whatever will be assigned to them.

The reconnaissance and permanent improvement crews will be used as protective forces to be summoned at any time in case of fire in the region in which they are working, with a possibility that in case the fire season becomes especially bad, the crews will be disintegrated more or less to permit sending individual members to different places to assist in handling or to take charge of fires. The men in such crews will be selected more or less with a view to the possibility of their being used in the capacity just mentioned and men in charge of such crews will be expected to see that the members of the crews understand the principles of fire fighting and the rules laid down in this circular.

Those district rangers who have not already done so should immediately furnish the office with a list of the places where fire fighting tools should be cached in their districts. For each cache the number and kind of tools should be specified.

The following rules should be followed without variation except by special authority from the Supervisor:

Rates:

1. The standard rate of pay shall be 25c per hour with board or 30c per hour if the employee boards himself, as in the case of a rancher or miner, living near the fire. Foremen in charge of crews shall receive 30c per hour and board. This applies only to men in charge of camps and not to so-called "straw bosses" temporarily in charge of a small gang.

Packers shall get \$3 per day, cooks \$3 per day and cookees \$2.50 per day. Cooks pay may be raised somewhat according to the size of the crew and the amount of help he has in the way of cookees, but should in no case exceed \$3.50 per day.

2. No fixed amount can be set for hire of pack horses and teams but the standard rate shall be \$1 per day for pack horses, the service providing their feed, and \$6 per day for man and team, the team to be fed by owner.

Time:

1. When hired at points involving a trip by rail or boat, fare and expenses while en route to points of disembarkation from the railroad will be met by the Service but no time allowed.

To protect the Service, the cost of transportation expenses en route should be deducted on the time slip if the man fails to work for a period of at least ten days, if needed. This rule should apply in case of discharge for inefficiency or other cause except on account of not being needed. Contracts will cover this point, but will not stipulate that no time will be allowed unless service has been rendered for at least 10 days. The form to be used is as follows:

United States Department of Agriculture.
Forest Service.

Waiver.

I, _____, having been employed by the Forest Service, United States Department of Agriculture, to fight fire on or adjacent to the national forests, in consideration of transportation furnished by the said Forest Service, from the place of employment to the point where my services may be required, and other valuable consideration, do hereby agree to work at least 10 days at such points as I may be assigned, and do hereby agree to have the cost of transportation and expenses en route deducted from the amount due me should I fail to complete 10 days' work, unless said employment be sooner terminated by the officers of the Forest Service because not longer needed.

2. When hired locally, time will be allowed from point at which hired, time to begin when start to fire is made; and when not hired locally time allowed from point of disembarkation on the railroad when start to the fire is made.

3. If the crew walks to the fire, time shall be allowed going in, the time to be fixed by the forest officer in charge, provided, if a man does not work at least two days if needed, his time going in shall not be allowed.

4. If wagon transportation is provided, time going in shall not be allowed.

5. Time will be allowed during subsequent transfers between fires.

6. Men who voluntarily quit or are discharged on account of inefficiency shall have their time and expenses both cease when they quit work.

7. All men who remain on the fire until discharged on account of not being needed will be allowed time walking back from the fire line to the railroad or the point at which hired.

8. Rail transportation shall not be allowed to the point where men are paid off, but the forest officer in charge may secure a ticket for such men as have no money

on a Government transportation request making a note of the deduction to be made on the time slip and the number of the transportation request.

9. When at work in the fire camp, time shall be allowed for going to and returning from the fire, provided that the ranger or foreman in charge, sets a time limit for the trip. As a general thing this should be the time in which he himself would make it.

10. Time should be turned in on the regular slips, form 874-15. All entries and signatures should be in ink or indelible pencil. No erasures of any character will be allowed on time slips. Time books of the ordinary type should be used in recording time in the field. To make available a supply of such books by requisition from the Ogden Supply Depot, the matter is now being taken up.

11. All accounts for commissary articles such as tobacco, blankets, shoes, etc., should be entered on the time slip and the amount deducted from the total amount due. The cash receipt should in all cases be signed for the full amount but payment should be made for the actual amount due. It is impossible to make deductions where payments are made by officials' checks. Where necessary to avoid mailing official check, cash payments may be made and a form 4 A sub-voucher taken and submitted for reimbursement on form 4. With the system of payments already outlined to you this should be necessary only in very exceptional cases. Where transportation request is used and a deduction is to be made, the cash receipt, should be made out for the amount on the time slip, minus the deduction, since the Government has already covered the amount due the railroad company with the request as a voucher.

12. In working on fires, twelve hours should be usually considered the maximum time per day. Time should not be allowed for over this amount unless it is impossible to avoid it and then only for short periods. Long shifts running up to 20 hours or more should be held to the extreme minimum. This should usually be not more than one shift of 20 hours or more per week. No hard and fast rule can be allowed in this but the standard above should serve as a guide to hold excessive time to the minimum.

14. In all cases the addresses of the men employed together with the names of the person they wish notified in case of accident should be kept in the time book in the space to be provided for this purpose.

The following list is given as a guide when ordering food supplies for crews of men. This list is a result of long field experience of the U. S. Geological Survey. A ration is the amount of food necessary to subsist one man one day:

Ration List.

Article	Unit	Rations
Fresh meat (a).....	pounds	100
Cured meat, canned meat, or cheese (b).....	pounds	50
Lard	pounds	15
Flour, bread or crackers..	pounds	80
Corn meal, cereals, maca- roni, sago or corn starch	pounds	15
Baking powder or yeast cakes	pounds	5
Sugar	pounds	40
Molasses	gallon	1
Coffee	pounds	12
Tea, chocolate or cocoa....	pounds	2
Milk condensed (c).....	cans	10
Butter	pounds	10
Dried fruit (d).....	pounds	20
Rice or beans.....	pounds	20
Potatoes or other fresh vegetables (e).....	pounds	100
Canned vegetables.....	cans	30
Spices	ounces	4
Flavoring extracts.....	ounces	4
Pepper or mustard.....	ounces	8
Pickles	quarts	3
vinegar	quarts	1
Salt	pounds	4

(a) Eggs may be substituted for fresh meat in the ration of 8 eggs for one pound of meat.

(b) Fresh meat and cured meat may be interchanged on the basis of 5 pounds of fresh for 2 pounds of cured.

(c) Fresh milk may be substituted for condensed milk in the ratio of quarts of fresh milk for 1 can of condensed.

The above ration list has been drawn up to cover the supplies found necessary for a crew of men permanently in the field. In case of fire fighters, however, it will not usually be necessary to maintain the crew long in the field. Therefore, so far as possible, rations should be supplied which do not require much cooking and which may be carried easily on the fire line. With this object in view, you will probably not, in most cases, need to order any flour, substituting in place of it bread already baked; while canned vegetables will probably be used more largely than appears on the list. You will also probably need more canned milk than 1-10 of a can per ration.

The following list gives the equipment as nearly as can be estimated which will be needed to handle a crew of ten men at a fire:

Equipment 10 Men.

No. of pieces and article.

- 2 5-gal. W. Bags.
- 2 2½-gal. W. Bags..
- 2 Canvas buckets.
- 3 12" Files.
- 14 Knives.
- 14 Forks.

- 14 Tea spoons.
- 16 Tin or granite plates.
- 16 Mush bowls.
- 18 Cups.
- 2 Milk pans.
- 1 Dish pan.
- 4 Fry pans.
- 10 Table spoons.
- 4 Stew kettles.
- 1 Meat fork.
- 1 Galv. water bucket.
- 1 Wash basin.
- 12 Wash towels.
- 12 Dish towels.
- 1 8-qt. coffee pot.
- 1 D. B. axe.
- 1 Tent, 7x9.
- 2 Butcher knives.
- 1 Can opener.
- 1 Granite stew pan.
- 1 Large stirring spoon.

As you will note, no means of baking, such as a dutch oven reflector or stove is covered on the list. In very exceptional cases where a fire is burning for a long time, it will probably be desirable to furnish some means for baking.

The following is a list of tools for the use of 10 men.

List of Tools for 10 Fire Fighters.

- | No. | Article. |
|-----|-----------|
| 4 | Axes. |
| 4 | Shovels. |
| 6 | Mattocks. |
| 1 | CC Saw. |

For supplying fire crews of more than 10 men it will probably be well to adhere fairly closely to the ratio here given between the different kinds of tools, although it should of course be varied to meet the needs of the situation in each particular case.

In order to secure the best possible use of fire patrol forces, a definite plan of permanent improvement work should be laid out in each district so that at times when weather conditions permit, the ranger may utilize the time of such patrolmen in doing this work.

Each district ranger should bear in mind that he may be instructed at any time by the Supervisor to put on an additional patrolman. For this purpose you should have in mind a number of good men in the vicinity who can be secured for the purpose at short notice. Furthermore, each district ranger should get as many persons as possible in his district to agree to respond to calls to assist in putting out fire and, still better, he should, whenever possible, get them to agree to go with tools and food to put out fires without being summoned.

Tentative arrangements should also be made to secure pack horses, wagons, etc., for use in case of fire so that we may not be forced into a position to be held up as

to prices when we have to take such means of transportation as we can get at any price. The success of the Service in handling the fire situation depends very largely upon the thoroughness and intelligence with which preparations are made in advance. Each district ranger will be held strictly accountable for proper preparations.

Seed-Eating Animals on the Tahoe

A lengthy article dealing with seed-eating animals appeared in the issue of "The Tahoe," the publication of the Tahoe national forest, and it is in part as follows:

In the usual order of things, seed producers and seed consumers are, upon the whole, in harmony. While land is covered with living timber there is a vast amount of seed that cannot possibly develop into mature plants. Such trees as have seeds of any considerable size are thus natural purveyors for seed-eating creatures both in fur and feathers. Many of these creatures have the habit of storing nuts and other seeds, for future consumption, which involves transportation, and it not infrequently happens that, through accident or oversight, seeds are left where they find suitable conditions in which to grow and reproduce their kind. Indeed, trees bearing seeds too heavy to be carried by the wind are distributed mainly through the provident labors of these animals. There is, therefore, normally a kind of interdependence between certain trees and certain animals.

The moment natural conditions are upset, however, this harmony gives place to antagonism. Let a fire reduce the forest to embers and bare earth, and the seed-eaters immediately become opposed to reforestation. Only the arboreal species are banished for more than a few months by a forest fire. The earth dwellers—ground squirrels, chipmunks, and mice—soon return to their old haunts and flourish upon the product of various herbs and deeply rooted shrubs, which spring up and clothe the ground in a single summer. But though they thrive and multiply under new conditions, their noses are ever keen for the scent of nuts.

When it is proposed to reforest a burn by seeding, an essential preliminary is to ascertain what kinds of rodents are upon it, how numerous they are and how they are distributed, in order that adequate steps may be taken for the protection of the seed to be planted. The necessity for this preliminary is made clear by the light of experience.

On a plantation made in the Tahoe forest during the winter following a fire in July, only 40 per cent of the seed spots produced seedlings. This loss was mainly due to Beechy ground squirrels and white-

footed mice; yet careful observation and trapping showed the average number of ground squirrels per acre to be only two or three per acre, and of mice to be about six. Had this burn been older there would undoubtedly have been a larger population of rodents upon it.

On a 12-year-old burn in the Black Hills forest 11 mice and 3 chipmunks were trapped on a half acre containing 2,000 seed sprouts. They had taken 70 per cent of the pine seed planted there in six days. One chipmunk was seen to visit 38 seed spots in four minutes. The need of attending to rodents prior to planting does not require further demonstration.

Where rodents are present signs of them can be discovered by scanning the ground, but the species to which they belong and their relative number can best be determined by the use of traps for a day or two. The catapult traps to be had at any hardware store serve every purpose, a dozen mouse traps and as many rat traps being sufficient. For bait, oatmeal or a scrap of bacon rind or, better still, both together, may be used. It is important to note whether the animals are concentrated in favorable situations or are generally distributed, as upon this point hangs the distribution of poisoned grain which is to be employed in exterminating the pests. An excellent poison may be prepared as follows:

Wheat	1 bushel
Water	1 quart
Starch.....	2 tablespoonfuls
Saccharine.....	2 teaspoonfuls
Strychnine (pulverized).....	2 ounces

Add the starch, saccharine and strychnine to the water, heat to boiling, and stir constantly after the starch begins to thicken. When the starch is fully cooked stir it into the wheat, every kernel of which should be coated. A galvanized iron wash-tub is an excellent mixing vessel, especially as it is easily cleaned. Either the sulphate or the alkalioid of strychnine may be used.

If rain is imminent and the poisoning cannot be delayed, melted tallow should be substituted for the starch solution as a coating medium. In this case the wheat should first be slightly warmed, the saccharine and strychnine added, and then the tallow applied, in the ratio of a quart to a bushel of wheat.

The putting out of poisoned grain depends entirely upon the number and distribution of the animals for which it is intended. In that part of the Tahoe National Forest near Nevada City, seed-eating rodents are not numerous relatively speaking. The mice are living chiefly about logs and stumps and in old gopher holes, and the ground squirrels are easily located by their burrows. Under such circumstances as these, poison need be put only in places

likely to be frequented by the pests. Wherever there is a general reforestation, however, poison should be dropped every three or four feet along parallel lines five yards apart. For mice and chipmunks 20 kernels in a place are sufficient, but ground squirrels should have a teaspoonful. Poison put on grazing land should be lightly scattered to prevent its being taken by domestic animals.

In deciding on the proper time to lay poison for the protection of seed there are several points to be considered. One of these is the date at which planting is to begin. Another is the habits of the animals aimed at. Mice are active at all seasons, but chipmunks and ground squirrels in the Tahoe forest hibernate during the winter. Again, in winter, quail and grouse feed on buds and seeds, and are in danger of taking bait intended for troublesome mammals. In the warm season this danger disappears. The writer, at different times, has had under observation several hundred acres of land thoroughly treated with poisoned grain in May and June; yet he never knew of one grouse or quail living there to be killed by it.

Fall Work for the Ranger ORDERS FOR COLLECTION OF SEED, FALL OF 1911.

(Contingent on conditions.)

District 1	lbs.	lbs.
Yellow pine.....	2,000	
Douglas fir.....	5,000	
Western white pine....	15,000	
Lodgepole pine.....	5,000	27,000
District 2		
Yellow pine.....	8,000	
Douglas fir.....	5,000	
Lodgepole pine.....	10,000	
Engelmann spruce.....	3,000	26,000
District 3		
Yellow pine.....	1,000	
Douglas fir.....	1,000	
Walnut	40,000	
Hickory	40,000	
Oak	20,000	102,000
District 4		
Yellow pine.....	2,000	
Douglas fir.....	4,000	
Engelmann spruce.....	2,000	
Lodgepole pine (from 2)		8,000
District 5		
Sugar pine.....	2,000	
Yellow pine.....	2,000	
Bigtrees	150	4,150

District 6

Yellow pine.....	2,000	
Douglas fir.....	20,000	
Sitka spruce.....	2,000	
Western red cedar.....	300	
Western white pine.....	500	24,800
		192,300

Area artificially sown or planted in 1910, less than 10,000 acres.

Area artificially sown or planted in 1911, over 20,000 acres.

Area which it is expected to sow or plant in fiscal year 1912, 30,000 acres.

Telephones on the Pecos National Forest

Experiments in the use of the emergency telephone equipment are now well under way on the Pecos Forest. The opportunity to inspect the use of the emergency surface wires resulted in the report that very satisfactory service was given. Two miles of various samples of wire were laid from the Glorieta Ranger Station to the Airline lookout point. These wires were reeled out on horseback from a spool placed on the horn of the saddle. At each half mile the portable test set was cut in and communication established with the Supervisor and District Office at Albuquerque. At the mountain top, which was reached one hour after leaving the station, the mine telephone set was permanently rigged and wired. Communication was at once established with the Supervisor's office 30 miles away and with the District office about 100 miles distant. The portable set was also cut in and worked splendidly even when the distance was increased to an artificial resistance of 30 miles. The tests so far have shown that No. 22 stranded copper wire at about \$7.45 a mile will perhaps be the most useful and certainly the most economical. The next size, No. 20 gauge, costs about \$20 per mile. This is the wire for which quotations were asked from the Western Electric Co. But no large orders for wire have been placed until the results of the experiments under way in this district shall have become known. The portable test set now weighs 11½ pounds, but this can be readily reduced to 10 pounds by the use of shorter lived batteries (two months) and the more compact assemblage of the equipment. A further reduction can be made to nine pounds by weakening the power of the generator, but this is extremely inadvisable.

STATE FOREST WORK

Sunapee Forest Reserve

It has been found desirable in New Hampshire that private individuals should co-operate with the state in saving portions of the forests which were threatened with destruction. Thus an organization, headed by a Philadelphia man, has just bought up 800 acres of forest land on Mount Sunapee, overlooking Sunapee Lake and the state commission has detailed a forest ranger to look after the tract, and to carry out plans for its development and protection from fire. This particular strip of woodland was threatened with cutting in order that the logs might be ground to pulp in a paper mill. By their action, the private individuals who raised the money for the purchase of the land have saved to themselves and to the state one of the most important scenic features of that section. Mount Sunapee would indeed have been desolate with the woods cut off in the thorough fashion in which paper mills cut them.

The danger which threatened these woods is also threatening any number of other beautiful sections in New Hampshire and Maine. The paper mills are remorseless in their demands. They want all the wood which is available. They do not care anything about the scenery; they do not care anything about conserving the water supply; they do not care about the feelings of summer visitors. All they wish is wood to feed the jaws of their great machines. And one may go through sections of the state mentioned and see how ruthlessly and thoroughly and unscientifically great sections have been cut over. If the state is ever to act it must act quickly. But states are slow. And in the meantime, this action of these people in New Hampshire, in raising a sum of money and purchasing a threatened section, is a shining example of what may be done in other places by other people who are interested in preserving the woods for their own sakes and for the sake of the scenic effect. A little co-operation now on the part of well-to-do private individuals will help to solve the problem until the time comes when states and the Federal Government shall take the action which is really needed.

California's Unique Forest

California, among many other natural wonders, contains a "Stone Forest." This is located in Sonoma county, only a few

miles from the little resort of Calistoga Springs. This "forest" consists of a great many petrified trees—all of which are prostrate.

In respect to the great number of petrified trees, and their immense size, the California "stone forest" surpasses that of Arizona. Strange to say, but very little is known about these wonderful Sonoma county petrifications—so far as the general public is concerned. Many of these trees are of enormous size. The famous "Queen of the Forest" is a pre-historic redwood, about 80 feet long, and nearly 12 feet in diameter. It has been broken in several places, and these breaks are as clean as if cut off with a saw. A tree has grown up through one of the breaks and has attained quite a large size. Another giant tree known as the "Monarch" lies near by, which is almost 90 feet long and is without a break. This tree is a fir, and averages 10 feet in diameter. Not far away is another giant son of the forest—a redwood that is about 60 feet long and is without a break. This tree broken into many hundreds of pieces, yet it retains its shape almost perfectly. Scattered about for the area of several acres, are many other pieces of petrification. So perfect has been the transmutation into stone, that the grain of the wood still remains very clear, and the variety of the tree may be easily determined.

Massachusetts' Plantations

Reforestation work conducted under the State Forester Frank W. Rane, has been suspended for the season. About seven hundred acres have been replanted this summer. The plantings have been made in Ashburnham, Fitchburg, Greenfield, Buckland, Hubbardston, Lancaster, Kingston, Shirley, Attleboro, Paxton and Hopkinton.

This is the third year of this kind of work. Formerly all the planting was done in the spring, but this year the forester divided it up so as to do some of it in the fall. Then the department will plan about three hundred acres more.

Approximately three thousand acres of land, deeded to the state by virtue of purchase or gift, have been replanted since the state started this forestry policy, three years ago, and the first plantings are now in a fine condition. Much more land is available and can be replanted as fast as

appropriations are made for it. This year the cost has been about \$8 per acre. It was more at the beginning of the work, and will be less in the future, as the state will be in a position soon to raise all its seedlings at its own nurseries. Up to now it has bought many seedlings both at home and abroad.

Carried along with this work are several state nurseries, the principal one being at Amherst, and out of these State Forester Rane will take most of the trees that are to be planted in the future. Expenses will be reduced when this becomes possible, and it is not improbable that enough plants can be taken out of the nurseries next year to conduct operations on as extensive a scale as at present. With the money the legislature has been appropriating in the past the state has planted about one thousand acres a year for three years and at that rate the nurseries are already able to supply the demands. The forester made an effort this year to have the work broadened, so as to plant several thousand acres a year, but the governor and the legislature have not yet shown any disposition to give their approval.

When the department took stock of the nursery at Amherst it found on hand seedlings worth \$7,380 on a conservative wholesale basis. The total expense of the nursery up to that time, May 10, 1911, was \$7,971 and for sales the department had taken in \$1,132, which have been turned back into the state treasury; trees shipped out in 1910 were valued at \$1,851, so that the actual cost of the present \$7,382 stock is \$4,987.

An inventory at the nursery shows the following stock on hand minus what has been taken out for transplanting this summer:

3-Year transplanted white pine....	36,000
1-Year white pine.....	1,500,000
1-Year Norway spruce.....	1,000,000
2-Year white pine transplanted....	170,000
2-Year white pine heeled in.....	224,000
2-Year white pine shipped.....	440,100
4-Year white pine shipped.....	11,500
4-Year white pine heeled in.....	11,000
3-Year box elder transplanted shipped	3,500
4-Year Norway spruce transplanted shipped	8,500
3-Year black locust transplanted, shipped	11,000
3-Year Catalpa Speciosa shipped...	9,500
3-Year honey locust transplanted shipped	60,000
2-Year white pine seedlings.....	500,000
2-Year red pine seedlings.....	25,000
3-Year white pine transplanted....	100,000

The above list shows 2,500,000 of white pine and Norway spruce which are only a year old and 500,000 white pine seedlings which are two years old. Out of the total of about fifteen different kinds the department

will have about 1,000,000 plants available for transplanting next year, and may not have to buy any outside. Considerable new ground has been seeded to keep the stock up and enlarge it for possible future demands.

Wisconsin Taking Stock

In response to a resolution introduced in the assembly, calling on State Forester Griffith for information regarding the number of acres of land now under option by the state board of forestry, the price to be paid per acre and also the price which has been paid for such lands, the state forester sent a communication to the assembly on Tuesday. In this report he says that the board holds no land under option.

Mr. Griffith included in his report lands which has been purchased from September, 1907, forward. Among the latest and heaviest purchases were 27,252.51 acres of the G. F. Sanborn Lumber Company, Eagle River, at \$3.50 per acre; 600 acres of the Buswell Manufacturing and Lumber Company, Wausau, at \$2.50 per acre; 640 acres of the Alexander Stewart Lumber Company, Wausau, at \$3 per acre, and 1,696 acres of the Yawkey-Bissell Lumber Company at \$2.50 per acre.

"All of the above purchases," said Mr. Griffith, "have been completed and fully paid for except the Yawkey-Bissell Lumber Company, the Goodyear Lumber Company and the G. F. Sanborn Lumber Company, which will be completed under land contracts as funds are available."

The total acreage of lands purchased is given at 111,407 acres. Of lands granted to the state by the Federal Government and the Nebegamon Lumber Company there are 24,321 acres, making a total acreage of 133,728 acres.

In conclusion Mr. Griffith said that most of the lands purchased contained valuable young timber, which, if protected from fire, would grow into valuable forests. The average price paid, he said, was \$3 per acre, which he considered reasonable considering the location, much of the land bordering on the lakes in the northern part of the State.

He claimed the state forest reserve lands were worth between \$1,500,000 and \$2,000,000. In order to protect its lands he said it was necessary for the state to secure lands scattered about among the state holdings. Only an ample appropriation for the use of the state board of forestry, he said, would enable the board to do this.

Mr. Griffith said the appropriation granted at this session of the legislature would "largely determine the future success of forestry in Wisconsin." As the assembly last week reduced the appropriation of \$200,000 annually recommended by the finance committee to \$50,000 the state board will apparently have to go slow for a time.

Vermont Planting Season

Now that the forest planting season has closed the following summary of the nursery stock sold by the state nursery may prove interesting. The total number of trees sold was 463,200, an increase of 85,500 over 1910. These went out to 73 different parties, private owners and corporations. An encouraging awakening occurred on the west side of the state. Whereas Windsor county has formerly led in this enterprise, Rutland county has this year planted the most trees, largely through the activity of the Vermont Marble Company and the Rutland Railway, Light and Power Company. Windsor county ranks second in this respect, the most extensive planting being done by W. D. Woolson, of Springfield; and Windham county is third. Considerable planting was done in Bennington, Essex and Lamoille counties this year, where very little interest has been shown previously. The largest private plantation made this year was that of Dr. William Stanford Stevens, of Enosburg, where about 45,000 trees were planted, part of which had been raised on his farm. Extensive plantations were made also on the state lands in Plainfield and Sharon and by the International Paper Company on its Vermont lands.

Up to the present time the state nursery has been unable to supply the demand for three-year-old trees, but from now on it is expected that practically unlimited orders can be filled, as about 600,000 two-year-old pine seedlings were this year transplanted in the nursery. White pine will continue to be the chief tree raised on the light soil of the Burlington nursery, but at the Sharon nursery, where the soil is somewhat better, it is planned to raise a large supply of Norway spruce. Great loss was suffered during the past winter in both nurseries on account of damage by ice, several hundred thousand seedlings being destroyed.

The forestry interests of Massachusetts are now, according to an observer, facing the most critical situation in their history. It has been said before in print that it is a waste to appropriate additional state's money for reforestation while fires and insect pests continue to destroy the forests. Ten trees are now cut down, owing to the oppressive tree moth-cleaning laws, to one that will ever be planted.

This state's supply of wood for all purposes is in her woods, and not in her shade or ornamental or roadside trees. Consequently the oppressive and so obnoxious tree-moth cleaning laws must be at once modified to bear less heavily on the forest owners, or they will be forced to cut down their trees, for, as the average value of the standing wood as it is in this state is from \$20 to \$35 per acre (and the cost of cleaning it the first year is over \$31 per acre by this state forester's report for

1910) the value of the wood is practically absorbed in the first year's cost of cleaning it. Therefore, the woodland owner must spend his money in destroying his forest before cleaning it at all, to prevent his being robbed of its whole value.

The Government's representative of the bureau of entomology in Boston says in his last report, issued August 13, 1910: "In eastern Massachusetts and southern New Hampshire there are large areas of forest lands which are covered with an inferior growth of trees and which are badly infested. In most cases the cost of cleaning up such areas would be more than the value of the property." This statement practically shows that it does not pay to clean forest lands of tree-moth insects, and corresponds with the statement said to have been made by this state's former superintendent of gypsy and brown-tail moth cleaning work. Mr. Kirkland, who was a great expert in that direction, said that he "could do practically nothing about properly cleaning forest lands."

Mr. D. M. Rogers, special Government field agent, is reported to have said of forest lands that "they are a loss to the owner practically in any event; for if he holds on to and cares for them, the expense is as much as the standing wood on them is worth. If he doesn't take care of them the moths will surely kill them." This proves that the sooner a forest owner eats down all of his woods the more money he will make or save. Mr. Rogers is also reported to have said that \$31 per acre for the first cleaning was as cheaply as it could be done.

The average woodland owner does not care a particle about scientific reforestation and ordinarily has no time or inclination to carry it on under the existing oppressive tree-moth cleaning laws and the constant meddling of moth cleaning officials with the trees on his lands.

All the woodland owner has in mind is the cash value of his standing wood, and so he wants to have his trees and his property let alone by the officials and the laws. The more rigidly the cleaning laws are enforced and the more personal and sectional favoritism there is shown, the faster the woods will be cut down by their angry owners, and more fires must result; for as it does not pay the owner of the woodland to clean the standing wood, it surely will not pay him to clean the moths off the bushes, and so he must burn such brushland over every six months to kill these bushes to prevent the leaves from growing at all in order to stop the moths nesting, and therefore greater forest fires must result from such burnings in the future than in the past.

It is estimated that it would cost from five to ten million dollars annually to clean up at all thoroughly the whole of the forest brush, and new-growth land in this state.

It is ridiculous to try and keep up the arbor day practice of planting new trees, with the destruction of old trees to new plantings going on in the ratio of 10 or more to one.

Destruction of the forests by their oppressed owners means a rapid loss of the wood pulp supply for newspaper use and the wood supply for all kinds of commercial and domestic purposes, with the resultant drought, with no fish in the streams, as there will be but little water in them; and no game in the woods, because there will be not forest for the game to hide in.

There must be no discrimination in favor of country as against city woodlands, or else woods in the cities, where they are the most necessary and appreciated, will all be destroyed before those in the country are cut down. Right here in Boston prominent people are refusing to plant shade trees about their residences because they will be obliged to clean them of tree-moths. This, of course, greatly injures the tree nursery business, as the woodland owner cannot afford to clean his trees and doesn't care whether the moths kill them or not; for if he is saved the, to him, wasteful expense of cleaning them, he can still use them for firewood at least, and perhaps other purposes just as well as if they were alive, and so the argument that if he doesn't clean his trees they will be killed, has not the slightest effect to cause him to clean them, as it has been previously clearly shown that it will not pay him to do so.

Therefore, no further appropriations of any sums of public money for reforestation or for tree-moth cleaning should be made in this state until the tree-moth cleaning laws are so modified as to prevent the owners from being forced to cut down their woodlands, owing to the legal right of the authorities to force upon them the cost of any such cleaning.

All the woodland owners, together with the farm owners throughout every state, should at once join together in an active campaign before the coming primary elections and oblige each candidate of every party to publicly declare whether or not he will use all his efforts to have the present tree-moth laws so modified that the tree-owners will no longer be oppressed or forced to clean their trees, or any tax or other charge at all for any cleaning be forced upon them.

Illinois

A bulletin on "Forest Conditions in Illinois," recently issued by the State Laboratory of Natural History, cooperating with the United States Forest Service, shows that about 2,000,000 acres, or about five and one half per cent of the land area of the state is forest, chiefly in the southern part of the state or near streams, and about ninety per cent is owned by farmers.

The bottom lands of the Wabash and Ohio rivers formerly contained the largest hardwood trees found in the United States. Nearly 100 kinds grew in these forests and giant sycamores and tulip trees were estimated to reach a height of about 200 feet. Little remains of these virgin forests, and nothing has been done to assure future growth of such timber.

In addition to these bottomland forests, in the southern part of the state, there are also those of the hills and of the upland plains. The hill forests are composed mainly of oak and hickory, supplemented by a variety of secondary kinds—walnut, maple, beech, red gum, tulip and cucumber trees; while the upland plains forests consist of a preponderance of oaks, intermingled with hickories or on wet grounds with post oak.

The forests of the northern part of the state are mainly confined to the vicinity of streams; and some few counties that were almost completely forested as Calhoun and Jo Daviess are not much cut over. The lowland forests of the northern parts are composed of elm, cottonwood, birch, oak, willow, and sycamore, and the upland forests of oak, hickories, cottonwood, red elm, cherry and rarely aspen, black birch, paper birch and white pine.

The present forest products are varied including lumber, railway ties, mine timbers, cooperage supplies, box materials, charcoal, fence posts, fire wood and nuts. It is advised that every well-managed farm should have its wood lot just as it should have its vegetable and fruit garden, and for the same kind of reasons it should be cared for to insure a future crop.

A recommendation is made that a state board of forestry be created, a state forester appointed, forest lands purchased for demonstration purposes, and a force of fire wardens organized.

NEWS AND NOTES

Canadian Forest Products

The output of sawn lumber in Canada, according to a report just issued by the forestry branch of the Department of the Interior, was 3,348,176,000 feet in 1908 and 3,814,942,000 in 1909. Oak, hickory and walnut, all of which were once cut into lumber in parts of Canada, have been exhausted, and figure now as "other woods," such trees as are marketed being taken from the uncleared portions of farms in the older settled districts. The "soft woods" are the mainstay of the industry, spruce leading in quantity, though not in value. This is followed in order of quantity by white pine, Douglas fir, hemlock, cedar, and red pine. In values for 1909, calculated at mill prices, white pine, \$22,563,447, led all the rest. Next came spruce, \$16,365,720; Douglas fir, \$6,850,579; hemlock, \$3,577,372; cedar, \$2,645,379; red pine, \$2,777,734; balsam, \$1,170,840; larch or tamarack, \$1,027,344; birch, \$990,393; maple, \$729,162; basswood, \$836,602; elm, \$582,999; jack pine, \$404,586; yellow pine, \$345,710; ash, \$315,367; beech, \$216,052; poplar, \$101,200; oak, \$199,205; hickory, \$22,100; walnut, \$2,440. Of the provinces Ontario leads in value of product, because of its white pine; Quebec has the heaviest output of spruce; and British Columbia of fir and cedar.

Of poles there were purchased by telegraph, telephone, electric light and power, and steam railway companies operating in Canada during 1909, 358,255, valued at the point of purchase at \$497,052. This was nearly double the quantity used in 1908. An increased number of short cedar poles was used, bringing the average price down from \$1.53 in 1908 to \$1.39 in 1909. Of the poles purchased 338,366 were cedar, the remainder being of larch, spruce, Douglas fir, and others unspecified.

One hundred and twenty-eight cooperage firms reported to the department. The total value of stock manufactured in 1909 was \$1,842,235, of which \$247,116, or 13.4 per cent of the total was tight cooperage and the remainder slack cooperage.

The reported consumption of lumber for boxes and box shooks for the whole of Canada in 1909 was 82,972,000 feet, valued at \$1,264,376. This was used by sixty firms, of which 25 were in Ontario, using 30.3 per cent and 22 in Quebec, using 41.5 per cent. The average value of this box material was \$15.24 per thousand feet. These

returns represent about sixty per cent of the lumber used by the box manufacturers of Canada, as they do not include the large quantities used by shippers of bulky freight of varying size, who find it more profitable to manufacture their own crates and packages.

A writer in the *Boston Transcript* recently reviewed in optimistic vein the forestry situation in Maine, holding that its timber operators have developed a conservative system of cropping which is fast gaining adherents and that the state is in no danger of losing its forest resources. What is being accomplished in Maine is by private owners, the state having done practically nothing. This writer says:

"It is a simple problem in invested capital. A company which has sunk two millions in a pulp manufacturing plant on a certain stream, with big holdings of forest at its headwaters learns that an expert forester affirms wasteful cutting to be not only beggaring the land, but drying the watercourse. He appears to be telling the truth. He is called in to look us over. We are told that we are on the direct route to put our plant out of business in a period which can be reckoned to the month, but that it is not too late to change. We change. This, in brief, is the history of timber conservation in Maine.

Directly the owners began to make their contracts more strict, independent land-owners and companies with large holdings discovered this means of prolonging the yield of their tracts and reducing the waste of cutting to a minimum. By explicit terms in the contract between owners and "operators," the cutters are obliged to observe certain rules in the economy of timber. By a system of inspection, often performed by experienced foresters, the owners are kept informed of whether these agreements are kept. If they are not, the operators are fined by being charged "double stumpage"—i. e., the price the operator pays the owner for the privilege of cutting, the amount of which is determined by a scale which gives the quantity of lumber by board feet. Thus the whole matter is managed without special legislation; the privilege of cutting is eagerly sought, and by the terms of the contract the owner may impose the fine for breach of agreement.

This programme is very different from the old system when woodsmen went into

the forest, selected only the big trees, cut them with a high stump, threw away all the upper branches, using only the stem, and wasted easily one-half of the tree. Now they are obliged to begin low on the trunks and to "work up" all of the tree that can be used. There is almost no waste.

The large companies are cutting more strictly. They have been brought to realize that wood pulp has come to stay as an article of commerce and that their plants must be fed not only next year but twenty years hence. Many of them hire trained foresters, as a farmer hires farm hands, and all of them employ expert woodsmen. Certain companies have engaged foresters to go into the woods and block whole regions into sections of one square mile. The quantity of timber on each of these 640-acre tracts is accurately estimated; its boundaries are blazed lines with marked cedar posts at their intersections; and that square mile is sure of intelligent cutting.

Few realize the vast extent of virgin forest which remains in Maine. Most of it has been notched along the watercourses, but nothing more. It was the custom in years past to cut along the water courses up the big rivers and smaller brooks, choosing only the timber which could easily be "toted" to the stream and brought down on spring freshets. But farther in these tracts there are miles of untouched trees as sound and tall as ever grew in Maine. These lands, thanks to the blocking system, will be cut economically. This economy has been learned in good season. The Bangor & Aroostook Railroad projects a new line through the heart of this unopened country to be called the "Allegash Extension." There is every indication that this will be built within a few years, and when it is quickened lumber activity and the opening of extensive and fertile farm lands is sure to follow. There is good reason to suppose that this development will be made wisely, thoroughly and consistently. A few years ago one could not have been so sure of this. The proposed Allegash Extension is a chapter by itself—of Maine politics, of railroad enterprise in the state, of the development of Maine's peculiar resources. The point at present is that whatever is done to the timber lands in consequence of its building will probably be done with a view to conservation of these resources.

Economy in cutting has been supplemented in Maine by the economy, equally important, of protection against forest fires. The records of the past few years tell their own story. Weather conditions in the spring of 1907, as most of us remember, were abnormal. It was the wettest season in years, rain following rain in an almost perpetual drizzle. The dampness continued most of the season and the loss by forest

fires was only \$14,567. The season of 1908 was as abnormal the other way: It will be remembered as the driest year in a decade or more. The drought began early in May and lasted until October 27. Of this period were only three weeks when forest fires would not run. With the utmost vigilance and much hard fighting the forest wardens kept the loss down to an estimate of \$618,816, and the area burned was less than one per cent of the wooded land of the state. In 1909 came the first real test of Maine's forest fire protection. The appropriation had been more than trebled (\$64,000), making possible more frequent patrols and lookouts. The estimate of damage dropped to \$96,699. Last year it was only \$2,841. The United States Government has copied Maine's system for preventing forest fires.

When we consider that this whole campaign of conservation and economical forestry dates back to 1902, it is to see that the country is not, after all, so slow to "catch on." In 1902 the first scientific forestry in Maine was begun by the United States for the Great Northern Paper Company. Three years later the field was entered by independent foresters, practising for private owners. It is only fair to add that no mean share of the missionary work was done by the Federation of Women's Clubs, which established a chair of forestry at the State University.

Maine has lost her merchant fleet and her ship-building industry, but she keeps her forests and by the present programme she will keep them. Last year 637,000,000 feet of lumber was cut, which is about the average, though this amount is increasing. Maine is learning to raise her annual crop of timber as a farmer raises potatoes or corn."

Cooperation with Lumbermen in New York

Commissioner Osborne, of New York, has undertaken to inaugurate closer cooperation with the lumbermen to check waste and promote reforestation. The commissioner sent Superintendent of State Forests Pettis and others of the state force, by arrangement with the company, on to a tract of 80,000 acres in St. Lawrence county, recently purchased by the Emporium Lumber Company of Buffalo. The state foresters will make an examination of the soil and ascertain the varieties of trees which are supported by it. As a result of this investigation by the foresters, the company will receive gratuitous expert advice as to which trees should be cut and which left standing with information along reforestation lines. In this way the state department will attempt to exert an influence to prevent operations that are wasteful and destructive of the forests.

The Pennsylvania Railroad and Reforestation

The forester of the Pennsylvania Railroad has issued his report for the year 1910, and it shows that since the company undertook forestry work on a comprehensive scale, 4,000,000 trees have been set out. Last year 617,338 trees were set in permanent locations on tracts of land adjacent to the company's right of way.

The forestry operations of the company extend to all points on the lines east of Pittsburgh and Erie. During last year 650 acres of idle land were set out in hardwood and evergreen seedling trees supplied by the company's own nursery at Morrisville, Pa. There were 200,000 trees planted on several of the company's properties at Altoona, 49,189 in the vicinity of Mount Union, 93,700 near Martic Forge, 65,500 at Newton Hamilton, 62,249 at Petersburg, 36,100 near Middletown, 12,000 at Vineyard, 10,000 at Ryde, 27,750 at Rambo, 5,000 at Conewago, 3,500 at Kinzer, 17,250 at New Brunswick, N. J., and 25,100 at Parkton, Md.

There were 32½ acres of land at Morrisville, Pa., devoted to nursery purposes, which afford a capacity of one million trees per year. To replace the seedling trees transferred last year to their permanent locations required the planting of 269 bushels of acorns and 116 pounds of seeds from coniferous trees. The total output of the company's nursery during the year was 766,924 trees. The stock on hand at the nursery at the close of the year was nearly one and one-half million forest trees, varying in age from eight months to four years, and 137,200 ornamental plants.

With a view to beautifying the lawns around stations and unoccupied places along the roadway much attention has been paid to the growing of ornamental plants and trees at the company's nursery. To save much of the time required to grow these from seed, there were imported from France during the year 41,696 deciduous ornamental plants, 5,480 coniferous ornamental trees and 107,935 coniferous forest seedlings. These were placed in beds at the nursery and will be ready for transplanting this year.

In addition to growing ornamental shrubbery and trees with a view to future requirements for ties and lumber, the Pennsylvania has established two large tie and timber treating plants, both using the pressure treatment, one at Mt. Union and the other at Greenwich Point, Philadelphia. These plants have a combined capacity per year of one and one-half million ties or their equivalent. The Mt. Union plant was in operation the entire year, while the one at Greenwich Point was placed in service July 1. In 1910 there were treated 671,369

ties, as well as four and one-half million feet of lumber and switch timbers, 5,432 fence posts, 10,592 cross-arms, 55,212 lineal feet of poles, and 90,306 paving blocks. To do this required 2,866,513 gallons of creosote, all of which was imported from Europe.

Old-Time Forest Waste

A remarkably shrewd forecast of the course of events in the United States for more than a century is to be found in the notes of the German traveler Johann David Schoepf, who visited the United States in 1783-1784, beginning his travels, indeed, before peace with England was ratified. Schoepf was a highly intelligent and well-educated man, with a sound scientific equipment, who held many posts of public trust, and at his death in 1800 he was president of the United Medical College of Ansbach and Bayreuth. Perhaps none of the distinguished Europeans who traveled in the United States in those first years was better equipped to form an intelligent opinion and the book which he published upon his return is of uncommon interest and value. Probably few Americans have ever seen it, and Willis J. Campbell of Philadelphia has done a useful service by publishing it in an English translation by Alfred J. Morrison.

Schoepf was a trained student of forestry, and he was shocked at the waste of valuable timber in America: "Not the least economy is observed with regard to forests." The owners of foundries, which then burned wood, usually held great tracts of timber, which was cut without any system or order. The Union, a high furnace in New Jersey, exhausted a forest of nearly 20,000 acres in about twelve to fifteen years, and the works had to be abandoned for lack of wood: "If it does not fortunately happen that rich coal mines are discovered, enabling such works to be carried on, as in England, with coal, it will go ill with them later on." Wherever he went, his eyes were on the forests; as he says: "What I saw every day and in the greatest number was trees." But while most Americans of that day were convinced of the inexhaustibility of the natural resources of the country, Schoepf, with the longer views which his scientific education gave him, looked less at the total mass than at the rate of waste. The destructiveness and improvidence of the Americans appalled him, yet he was quite able to comprehend it and explain it to his European readers—his book, indeed, is admirably just and friendly in tone, resembling Humboldt's books in this respect, though he has not Humboldt's finished style.

FORESTRY ORGANIZATIONS

State and Local

This list is made up from the latest obtainable information. Corrections will be carefully recorded. Those associations marked with a * have made no recent returns and the data given are not vouched for.

<i>Name of Organization</i>	<i>Secretary</i>	<i>Address</i>
Appalachian Mountain Club.....	R. B. Lawrence.....	Tremont Bldg., Bos.
Arizona:		
Salt River Valley Water Users' Association.*	Charles A. Van der Veer	Phoenix.
California:		
Water and Forest Association.....	I. C. Friedlander.....	1405 The Merchants Exchange Bldg., San Francisco.
Forestry Educational Association*.....	E. C. Damon.....	San Diego.
Sierra Club.....	William E. Colby.....	San Francisco.
Pacific Coast Forest, Fish and Game Association.*	Wm. Greer Harrison...	San Francisco.
Tri-counties Reforestation Committee...	Miss C. J. Jensen.....	Riverside.
Colorado Forestry Association.....	Ellsworth Bethel.....	Denver.
Connecticut Forestry Association.....	P. H. Stadtmüller.....	Elmwood.
Georgia Forest Association.....	Alfred Akerman.....	Athens.
Indiana Forestry Association.....	George B. Lockwood...	Marion.
Iowa Park and Forestry Association.....	Welsey Greene.....	Des Moines.
Louisiana Forestry Association.....	Mrs. A. B. Avery.....	254 Stoner Avenue, Shreveport.
Maine Forestry Association.....	Edgar E. Ring.....	Augusta.
Massachusetts Forestry Association.....	Irving T. Guild.....	4 Joy St., Boston.
Michigan Forestry Association.....	H. G. Stevens (Asst. Secy.).	525 Bank Chambers, Detroit.
Minnesota Forestry Association.....	E. G. Cheyney.....	St. Anthony Park.
Nebraska Park and Forestry Association...	Miss Leila B. Craig....	York.
Society for the Protection of New Hampshire Forests.	Allen Hollis.....	Concord, N. H.
New York:		
Forestry, Water Storage and Manufacturing Association of the State of New York.	Chester W. Lyman.....	30 Broad St., New York.
Northern New York Forestry Association*	O. B. Trappan, Director.	Potsdam, N. Y.
New York State, Fish, Game and Forest League.	L. C. Andrews.....	Elmira.
The Association for the Protection of the Adirondacks.	E. H. Hall.....	Tribune Bldg., New York City.
North Dakota State Sylvaton Society*.....	Miss Ella J. Mitchell...	Penn.
Ohio:		
Cincinnati Forest and Improvement Association.*	Adolph Leue.....	127 West Twelfth St., Cincinnati.
Ohio State Forestry Society.....	Prof. J. J. Crumley....	Wooster.
Oregon Conservation Association.....	A. B. Wastell.....	904 Lewis Bldg., Portland.
Pennsylvania:		
Franklin Forestry Society*.....	W. G. Bowers.....	Chambersburg.
Pennsylvania Forestry Association.....	F. L. Bitler.....	1012 Walnut St., Philadelphia.
Forestry Association of Vermont.....	Ernest Hitchcock.....	Pittsford.
Washington Conservation Association*....	Clarence H. Bailey.....	P. O. Box 236, Seattle.
West Virginia Forestry Association.....	A. W. Nolan.....	Morgantown.

Hon. Robert Perkins Bass
Governor of New Hamp-
shire, elected President of The
American Forestry Association
August 3, 1911, to succeed Hon.
Curtis Guild. :: :: ::



HON. ROBERT PERKINS BASS

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THE PLACE OF FORESTRY IN THE SCHOOL

BY DON CARLOS ELLIS

UNITED STATES FOREST SERVICE

THE ideal school is an ever-changing institution, which is constantly adjusting itself to its ever-changing needs. With the modifications taking place in our political, economic, and social life and the development of science, modern education must also change or fail in its mission. We have passed beyond the period when education was for culture alone. Education for efficiency is the battle cry today; and it is required that the school, besides training the mind of the pupil, give him instruction in those problems which he is to face in his later endeavors. To accomplish this the work of the school must be correlated with the activities of the world outside. Important among the scientific and economic developments of this century is the advance of the principles of conservation into national prominence. The progress made by this movement within the past few years has been without precedent. The importance of the conservation of natural resources had long been appreciated in the old world, and its principles applied. It is new to America, because the country itself is new and its resources only in the early stages of their depletion. Until very recently, our resources were valued only for their immediate exploitation, and no thought was given to the morrow. Today no economic problem is given more public attention.

The idea of conservation is the greatest constructive idea of the times. Although a new one in this country and of very rapid development, it has come to stay. There is a danger, however, as in all movements of unusually rapid growth, that it may lose much of its force unless adequate means are employed to crystalize and perpetuate the intense popular approval which this generation is giving it. One of the means to this end is legislation; but a far more important one is the school. Early impressions are the ones that persist. Principles inculcated in the formative period of youth become ingrained into the character and partake, in a way, of the very nature of a man. If we would have a child develop into a financier, it is best to direct his attentions early to the problems of finance; if we would have the man a farmer, it is safest to make him one when still a youth. And the same applies to the wider field of citizenship. If we expect to produce a good citizen, the principles underlying useful citizenship should be inculcated in the boy or girl; and if we would save our country from the folly of wastefulness and thriftlessness, the principles of thrift should be instilled into the new genera-

tion. You may print conservation in the press, declaim it from the rostrum, and preach it from the pulpit, but unless you teach it in the school, it must die with the generation that gives its birth. Conservation has become popular today largely because of the wonderful propaganda which has been waged in its favor. But a propaganda is of its nature ephemeral. It cannot last indefinitely; it cannot continue from generation to generation with the same fervor and the same efficiency that it shows at the climax of its early successes. It must either produce a permanent status or fail. The conservation propaganda, has impressed a permanent character on this generation, but it remains for the teachers of the land to decide how many generations it is to persist. Even our legislators have not this power, for though they may enact the soundest legislation, unless they have an educated public opinion to support it, it would be better that the laws had never been made.

Conservation, in this country as in most countries which have adopted any system of saving their resources, began with forest conservation, because the forests of a country are logically the first of its resources to become impoverished. A system for the preservation of the forests of the nation was being successfully applied long before its exponents thought of the wider activity. So, forest conservation was the forerunner of the whole conservation movement. Furthermore, the same practices which have been demonstrated as true and applicable in the case of the preservation of our woodlands have been found in a general way suited to all our other resources. The general principles of wise and economical use, elimination of waste, and provision for the future apply as well to minerals, soils, and waters, as to forests. This particular phase of the conservation work, forestry, has, therefore become a type of the rest, and in considering the general principles governing it, we come to understand the principles underlying all conservation. The preservation of the forests is intimately associated with the preservation of the land both within and without the forest, which it fertilizes and saves from erosion and floods, with the preservation of the minerals deposited beneath the hills; with water power and navigation the sources of whose regular supply it rules with our recreation grounds, which depend primarily for their beauty and healthfulness upon the forest; and with our game, which have their life in the woods, and our fish which swim in the waters arising in it. Then, too, of all our resources, the forest is in the most imminent danger of exhaustion, and next to soils is generally admitted to be the most important. Conservation deserves place in the schools; and the study of the forest and its preservation is a most practicable form in which to teach its principles, especially in the limited time which it is possible for most schools to give to it.

It is not only as a carrier for the study of general conservation, however, that forestry is valuable. Besides being highly cultural, it holds in itself a rich treasury of useful knowledge. Every citizen should understand the relation of the forest to the industries, the beauties, the health, and wealth of the nation. Such an understanding would make impossible the shameful waste of our forests which has been going on for so many years. A nation which understood its forests and their value would not countenance an annual loss by forest fires of fifty million dollars' worth of timber when that loss could be practically all prevented for an expenditure amounting to about one-fifth that loss, it would not stand idly by and see twice as much timber wasted as is used, it would not permit its woodlands to be so poorly managed that they grow only one-third the amount of timber that is being removed, when under proper management their growth could be twice doubled; it would not tolerate the spectacle which the last half century has witnessed, of the theft of millions of acres of valuable government timberland.



AN IDEAL SPOT IN WHICH TO STUDY THE RELATIONS OF THE FOREST TO STREAM FLOW



THE PLACE OF FORESTRY IN THE SCHOOL

AN UPTURNED TREE GIVES OPPORTUNITY TO STUDY THE ROOT STRUCTURE AND ITS OFFICE IN HOLDING THE SOIL IN PLACE



THE FOREST IS AS ATTRACTIVE IN WINTER
AS IN SUMMER



THE PLACE OF FORESTRY IN
THE SCHOOL

THE STUDY OF THE FOREST PUTS THE STUDENT
IN INTIMATE CONTACT WITH NATURE IN HER
MOST BEAUTIFUL FORMS

A separate course of forest study is not advocated, except in technical and agricultural schools; the curricula of our ordinary schools are already crowded. The subject should rather be taken up as part of courses already established, and it fits admirably and logically into many of them. American history, civics, and economics, physical and commercial geography, botany, manual training, nature study, and agriculture are in this day incomplete unless they give attention to the forests, their uses and influences, their exploitation, and the methods being advanced for their perpetuation and saner use. To begin with the elemental, the forest holds for nature study a wealth of material; the study of leaves and twigs, the identification of trees in winter and summer, the life of the tree and of the forest, and its influences upon the soils and waters and vegetable and animal life, all furnish sources of delightful study. Many of the most interesting lessons of botany can be learned from the trees. They present a great variety of plant life, and many botanical phenomena can be found nowhere else but in the forest. Then there is the further advantages that trees show many features of plant life on a large scale and that they are always accessible at all seasons of the year and are as full of interest in winter as in summer. Geology and geography, if they be adequately treated, must teach of the forest's influence upon land formation, soil fertility, the fixation and disintegration of sand, and the regularity of stream flow. Industrial and commercial geography should include a consideration of lumbering and of the many other wood-using industries which form so large a bulk of the country's business. Our forest areas, besides their direct control of lumbering, the fourth greatest of the country's industries, of the pulpwood and cooperage stock manufacturing and of the other wood-using industries and the influence which their supply of wood exerts directly or indirectly upon the innumerable other great commercial pursuits, affect also every industry which depends upon a regular supply of water, equable climate and fertile soils upon the slopes. The influences which the forests have had upon our civilization, first as an obstacle to be overcome, then as a prominent asset in the development of our wealth, and today as the most important factor in the conservation movement give them a definite place in the history and economics of the country. The need of a knowledge of woods in wood-working courses scarcely requires mention, and as for the place of forestry in agricultural studies, it is a decadent and obsolete form of the science of agriculture which excludes it. Forestry bears an intimate relation to agriculture and no agricultural course is complete unless it treats of the place of the woodlot in its relation to the farm, its value in supplying wood for farm uses and even for the market, its usefulness as a shelterbelt to the crops, the stock, and the dwellings, its ability to grow on tracts of land not suited to other farm crops and the problems of its care and management.*

The acknowledged tendency in the schools today is toward a judicious combination of theory and practice, toward the concrete and away from the abstract, toward investigation of original material rather than of reproductions and representations, and parallel with this tendency is an effort to get the pupils more into the open air and into field work. The study of the forest and of forestry as it is being generally presented for the consideration of teachers admirably satisfies both of these tendencies. It is essentially an out-of-door subject, it brings the student right into the woods and fields; it puts him in intimate contact with real things in nature, where he can study at first hand, and it makes him familiar with nature in her most beautiful

*Outlines of the study of forestry for different courses can be found in Forest Service circular 130, "Forestry in the Public Schools," which may be obtained from the U. S. Department of Agriculture, Washington, D. C.

forms. In this subject nature freely unfolds many of her charms. The forest is filled with interesting and wonderful things at every season of the year. It may be visited in winter as well as summer, and when in winter garb it reveals many secrets that are hidden during the other months. Even for class-room and laboratory work, the forest furnishes a wealth of material. It may be dissected and brought piecemeal to the very desks of the pupils and to decorate the walls of the class room. Studies capable of illustration with such easily obtainable and such tangible material have a great advantage over other studies, in that the child mind can reach the abstract only through things which appeal directly to his senses.

As an adaption of the school garden, which has of late become very popular and justly so, comes the school forest nursery, where trees can be grown from seeds of cuttings, and the seedlings used for school plantations, for roadside planting, for the beautification of home yards, and the like. Not only would those nurseries give many practical lessons in tree growing and planting and inculcate a lasting love of trees and an appreciation of their benefits, lessons which could probably not be impressed so permanently in any other way, but they would possess the advantage over the school garden that they could sustain the child's interest in the same individual plants during his whole course, since there would not be the yearly maturing of the crop as is the case in the garden.*

What is perhaps the most forceful argument has been left to the last. It is the vigorous indorsement which has been given by teachers themselves to the introduction of this study. Recently the Forest Service of the United States Department of Agriculture made a census of state, county, and city superintendencies and normal schools in which the subject of the forest was taught in any form. Seven hundred and fifty-one superintendents reported that the subject was taught in at least some of the schools under their supervision, while four hundred and sixty-one indicated their willingness to consider its introduction. Of the normal schools, out of two hundred and twenty-one which replied, one hundred and thirty-nine reported that forestry or tree study was one of the branches taught and forty-seven indicated a desire to introduce it. The forest study pursued in those schools ranged in all degrees from the simplest forms of the study included incidentally in nature study or botany to well developed courses of the science. In some superintendencies the subject was taught in all the schools, in others only a few schools in each had introduced it. The reports from the normal schools were the most gratifying, not only in the relative number of schools which were teaching the subject, but in the excellence and completeness of many of the courses. The greatest obstacles to the widespread introduction of forestry in the schools has been the lack of the requisite knowledge on the part of the teachers. It is particularly auspicious, therefore, that the subject is being so well established in the normal schools. The summer training schools for teachers at some of the universities, notably The Summer School of the South, at the University of Tennessee, have also taken up the work. The tendency is significant. Up to a few years ago, the study of the forest was scarcely known outside of a few technical schools and even simple tree study occupied but a very minor place. It is now receiving the consideration of the educators of the entire country and is gaining for itself a position in the school commensurate with its importance to the nation.

*Complete directions for establishing and maintaining a school nursery are given in Farmers' Bulletin 423, "Forest Nurseries for Schools," which may be had free from the U. S. Department of Agriculture, Washington, D. C.



EXCELLENT OPPORTUNITY IS
AFFORDED FOR FIELD WORK



THE PLACE OF FORESTRY IN THE
SCHOOL

A PLANTATION OF TREES IN A SCHOOL
YARD IN JOLIET, ILLINOIS, RAISED
IN THE SCHOOL NURSERY



A FOREST SCHOOL IN THE PHILIPPINES

THE BROAD VERANDAS OF FORESTER'S HOUSE
COMMAND AN UNINTERRUPTED PANORAMA
OF PALM-GIRT PLAIN, LAKE AND MOUNTAIN

A FOREST SCHOOL IN THE PHILIPPINES

BY W. F. SHERFESEE

IN JUNE, 1910, scarcely more than a year ago, was opened the first school of forestry ever established in the Philippine Islands. For several years the necessity of such an institution had been making itself more and more strongly felt. The virgin forests of the islands cover some forty thousand square miles—one of the finest bodies of hardwood timber in the world—and in addition there are some twenty thousand square miles of second growth forests. Much of the timber does not lie in easily accessible, compact bodies, but is scattered over more than three thousand islands, most of which are mountainous and some are exceedingly rugged. The number of dialects spoken by the inhabitants is variously estimated at from thirty to eighty so that even an accomplished linguist can hope to become acquainted with only a discouragingly small percentage. There is no common language, for English is still the accomplishment of the schoolboy and the government employee, and Spanish was and remains the possession principally of the *ilustrados*, or educated classes. In the early days the Filipinos were hostile to the agents of the new régime, and although at present most of the archipelago is as peaceful as a rural American village, the other difficulties suffice to render the efficient patrolling and protection of the public forests by no means a simple task. The right sort of Americans are hard to get; their service is expensive and they are unfamiliar with the country, its languages and customs. Hence they are employed in the Bureau of Forestry only in administrative and scientific capacities, and the actual work in the field must be entrusted to the Filipinos.

An untrained Filipino is at least no better than an untrained American, but fortunately the brighter ones are quick to learn and, after a fair amount of training, develop into excellent guards and rangers. A thorough familiarity with the topography, languages and customs of the country and people gives them an enormous advantage over strangers, and even if Americans could be secured in sufficient numbers, these advantages possessed by the Filipinos would make their employment preferable. Aside from these considerations it is also the fixed policy of the American administration in the islands to employ Filipinos for all positions which they are capable of filling. The chief difficulty hitherto has been that the demand for Filipinos in the Government service has far exceeded the number of applicants who have sufficient education to discharge the duties incumbent upon them; and just as in the United States it was necessary to train up foresters from the beginning to carry on the work of administering the timber lands of the government, so the Philippine Bureau of Forestry found itself seriously handicapped in the discharge of its duties because of the lack of an efficiently trained native force.

At first the founding of a regular forest school was impossible; sufficient funds were lacking and the scanty force of Americans in the bureau was too much taken up by administrative duties to permit them to do more towards educating the Filipino rangers than by such instruction as could be given in the field during the discharge of ordinary forest duties. Gradually, however, a

certain number of Filipinos, educated either in the United States or by close contact with American foresters in the Philippines for several years, had developed sufficiently to permit them to be placed in positions of responsibility hitherto occupied only by Americans. In addition the force of American foresters in the bureau was somewhat enlarged.

These conditions, then, permitted Major George P. Ahern, the Director of Forestry, to carry out his long-cherished scheme of founding a forest school for the training of head rangers and possibly later on of technical foresters. In the session of the Second Philippine Assembly held early in the spring of 1910, he secured the passage of a bill which permitted him to establish a Forest School in connection with the College of Agriculture of the University of the Philippines and to appoint twenty *pensionados* or holders of government scholarships, for the two years' course at the school. Buildings were erected and foresters were detailed from the bureau to give the technical courses in forestry, the auxiliary courses being supplied by the faculty of the College of Agriculture. This year the number of new *pensionados* has been almost doubled, one such position being made available from each province under the jurisdiction of the Philippine Assembly and from certain special provinces which are still governed directly by the Philippine Commission. These scholarships now pay the students twenty-five pesos per month in cash, and in addition they are provided with free living quarters and with most of the books and other supplies needed in their courses. A commodious mess hall has also been built by the bureau and is fully equipped with cooking utensils, dishes, etc. Here the students now run their own mess and secure excellent meals for about four dollars per month. They employ their own cook and are establishing a kitchen garden for growing their own vegetables.

The *pensionados'* traveling expenses to and from the school are refunded by the Bureau of Forestry and upon the successful completion of the course each such student is guaranteed a position in the bureau at a good salary without the necessity of taking a civil service examination. On accepting the scholarships, they, in return, bind themselves to enter the employ of the bureau on the completion of the work for as long a period as they shall have enjoyed the privileges of the scholarships. There are also several private students taking the course in forestry. No special inducements are made them, but they are furnished free quarters if such are available.

The new school year opened in June of the present year and in order to insure an adequate faculty the entire division of investigation of the Bureau of Forestry has been transferred to Los Baños in the province of La Laguna, where the forest school is situated. Residences and an office building have been constructed for the members of the division and the grounds around the buildings have been parked. Plans are now being made for the establishment of a large central nursery near the school which will be used not only for growing tree seedlings for extensive work in reforestation, but which will afford the students an opportunity to secure practice in nursery work and transplanting.

The faculty of the technical course in forestry is made up as follows:

Major George P. Ahern, professor of forestry;

Dr. H. N. Whitford, associate professor of forest botany;

H. M. Curran, associate professor of forest management;

Dr. F. W. Foxworthy, assistant professor of wood technology;

D. M. Matthews, instructor in forestry and secretary of the Forest School;

M. J. Oteyza, assistant in field methods.

In addition special lecturers will be detailed from time to time from the Bureau of Forestry for certain courses. It is apparent that the faculty is exceedingly strong. It was only made possible by transferring the division



A ROW OF STUDENT COTTAGES



A FOREST SCHOOL IN THE
PHILIPPINES

THE TENNIS COURTS AT THE FOREST SCHOOL.
THE FILIPINOS HAVE EAGERLY ADOPTED MANY
AMERICAN ATHLETIC GAMES



THE SALA OF THE FORESTER'S HOUSE



A FOREST SCHOOL IN THE PHILIPPINES

THE STUDENT MESS HALL

of investigation to the site of the school, so that the members of the faculty will be enabled to devote to their work of investigation such time as is not taken up by their lectures and field work.

Two years and a vacation period are necessary to complete the forest course, and only those students who have had at least two years' work in one of the government high schools, or its equivalent, are accepted. Arrangements, however, have been made with the College of Agriculture whereby students who lack such training can spend one or two years in preparatory work before they take up the exclusive study of forestry. The course at present is by no means designed to turn out scientifically trained technical foresters; if it performs the mission for which it has been established its graduates will be well-equipped to carry on the actual forest work in the field in the capacities of rangers and head rangers with the chance of promotion to positions which might be roughly compared to deputy supervisorships, or even to full supervisorships in the United States Service.

The outline of the two years' course in forestry is given below:

Junior Year.

Mathematics (geometry and trigonometry, with special attention to surveying).

Physiography, soils and climatology.

Mapping.

History, law, and procedure of forestry.

Forest botany and ecology.

Vacation Work.

Forest mensuration.

Lumbering.

Camp life.

Senior Year.

Wood Technology.

Forest Engineering.

Silviculture.

Forest Management.

The school is exceptionally well situated, about thirty miles from Manila, near the shore of the large lake known as "Laguna de Bay," which drains through the Pasig River into Manila Bay. Just at the rear of the school grounds is the boundary of the Maquiling Forest Reserve, embracing the forests on and around Mount Maquiling, a magnificent tropical mountain rising abruptly from a plain practically at sea level to a height of some four thousand feet. The entire forest reserve with an approximate area of fifteen thousand acres, embracing most of the principal forest types in the Philippines, is thus available for all kinds of field work necessary for a complete course in forestry with the exception of lumbering. To fill this want each class is required to spend one vacation period at the seat of some extensive lumbering operation where, under the supervision of the instructors of the school, they carry on field work analogous to that performed by students in the forest schools of the United States during their annual trips to lumber camps.

All in all the school has opened under exceptionally auspicious circumstances, and there is every reason to expect that it will speedily become recognized as one of the best second grade forest schools in the Far East, comparing favorably with those in Japan and the ones which the English have established in India and Burma.

FOREST SCHOOLS OF THE UNITED STATES

II

College of Forestry, University of Minnesota

By EDWARD G. CHEYNEY, B. S.

PROFESSOR OF FORESTRY



MAP OF ITASCA STATE PARK
SUMMER HOME OF THE COLLEGE

THE forestry course of the University of Minnesota is organized as a college of the agricultural department, with its headquarters at University Farm, St. Anthony Park, St. Paul. This would seem to indicate a wide separation from the rest of the university in Minneapolis, but the difference is really only a matter of fifteen minutes and the students of the two divisions mingle more or less throughout the four years of the course. It is an integral part of the university and the students benefit by all the broadening influences that such environment brings.

The curriculum is a four-year course including the necessary basic sciences and the technical forestry required by the present conditions and the future development of the profession. The pure science is grouped in the first two years, so that any student who finds that he has selected the wrong course—as many are likely to do when a subject is popular, little known and

booming—may change without losing any credits. The whole course gives a broad scientific training which makes a good basis for any scientific work. This is important for it can no more be expected that every student of forestry

will become a forester than that every graduate of a medical school will practice medicine. At the same time the graduate is prepared for any work that the professional forester may legitimately be called upon to do. The entrance requirements are the same as for the rest of the university and are strictly enforced. Work done in other colleges and universities is accepted only in so far as it covers the course. Few substitutions are allowed and special students are not accepted unless they are older than the average and have had considerable experience along the lines they wish to study.

There are at present about 110 students in the college of whom fifty are freshmen. Many of these drop out before the second year. This is due both to the natural culling out of the weak members which occurs in all popular courses and to the fact mentioned above that many come into the course without knowing really what it is and later change to another course. The graduating class averages about fifteen.

The faculty consists of a director and two assistants, all trained foresters, to handle the technical subjects, and a number of professors from the academic and agricultural colleges to give the pure science and special courses. This faculty is further augmented by the State Forester, his assistants and various other special lecturers chosen from the lumbermen of the region and the investigators of the Forest Products Laboratory at Madison.

At St. Anthony Park all the general and all the theoretical work is given; as well as the manufacturing for which the mills and factories around Minneapolis give every facility. These are visited by means of class excursions. In addition to the school at St. Anthony Park the college has two forest experiment stations which play an important part in the school work. One of these, located at Itasca State Park, is the summer home of the college. About five thousand acres are here at the disposal of the school for experimental and demonstration purposes. The tract contains about every type found in the pine forests of the lake States. Here the freshman class works at elementary silviculture and mensuration from the first of June to the first of August, and the juniors have field work in advanced silviculture, seeding and planting, mensuration, engineering, plant pathology and entomology from the middle of April till about the first of September.

The equipment here consists of a bunk house and dining hall for the students, a row of four cottages for the faculty, an administration building and a large barn; all of logs. There is also a frame dwelling house for the foreman and a large seed house for the nursery. The whole camp is equipped with running water and up-to-date devices for sewage and garbage disposal. This part of the college is located in an ideal spot on the shore of Itasca Lake about a mile from the outlet where the Father of Waters starts on its winding way to the Gulf of Mexico.

The camp is to a large extent self-governing. The students form themselves into a club, hire their own cook, buy their own supplies, and board all other members of the camp who care to mess with them, thus getting cheaper board and the experience of running the camp. They also have their own gardens, sometimes keep their own cows and keep the camp in order generally. This summer's experience gives them an insight and an understanding of the proper point of view for their senior work as nothing else could and makes each man thoroughly familiar with the woods life in all its summer phases.

The second experiment station is situated about three miles from Carlton, Minn. It is a tract of 2,600 acres of typical northern coniferous forests. A neat little log cabin is the headquarters of the forest and a member of the faculty is stationed there in the summer. The tract is devoted to silvicultural experiments. The senior class students work on these experiments in the

spring, and make the station their headquarters when they go to the lumbering camps of that region in the winter. It is there that the great problems of the Lakes forest will be solved, and the original work of solving these problems will be a tremendous stimulation to both faculty and students, for no man can teach a subject successfully unless he himself is studying and developing it.

The curriculum has three objects in view: (1) the training of a competent and fully equipped professional forester; (2) a well-rounded scientific education; (3) the teaching of such subjects as will make a man at home and satisfied in the woods.

The first group naturally receives the most attention. It consists of courses in dendrology, silviculture, surveying, drawing, protection, mensuration, management, lumbering, lumber manufacturing, forest by-products, and forest economics, tree diseases, forest entomology and wood technology. The time spent at Itasca, Cloquet and the lumber camps is looked upon as laboratory work. The sophomores are encouraged to take jobs in the woods for the summer months and most of them are placed in the forests of the Rockies and the Pacific Coast.

A broad, all-round education is necessary both on account of the scope of the forester's duties and connections, and for the reason already stated that all those who study forestry will not continue in the profession. This is true at the present time and will be even more true in the future. The graduate school gets this work ready made, but the undergraduate school must do it for itself. To fulfill this object courses are given in botany, geology, chemistry, zoology, languages and economics. The amount of this work offered is limited only by the time available.

The third group receives the least time and attention but is nevertheless vital. No man can make a success of his business unless he is thoroughly interested in it and contented with it. This he cannot be if he is not in sympathy with his surroundings. There are no horse shows, theater parties, football games and other social amusements in the back woods where the forester's work will take him; there may not be a single soul within hailing distance with whom he can talk of the things which used to be part of his life. If he still depends on those things for his amusement he will be lonely and his trials will be many. All stones will be rock, all flowers brush, and all other forms of life varmints to be shunned or neglected as he may deem them dangerous or harmless. With botany, geology, zoology, entymology and a knowledge of game and fish every particle of woods life takes on an interest that is irresistible, and loneliness in the woods is almost impossible. This intimacy with woods life is no small part of the benefit of the months at Itasca.



PUBLIC ASPECTS OF FORESTRY

By H. S. GRAVES

(Address delivered at Bretton Woods, N. H., August 2, 1911.)

FORESTRY is a national necessity. There must be forests to provide the wood, lumber, and other products of trees required by the people. Forests are needed to protect the slopes of mountains, and to conserve the sources of rivers; and they are valuable as health and pleasure resorts, game refuges, etc. Altogether, they are practically indispensable to the general public. Extensive forest destruction invariably results in serious public injury. In a new country with extensive forests and a relatively small population the effects of forest destruction are not at first noticed. This has been the case in the United States and it is only recently that people have awakened to the realization of the economic loss already suffered by the country through unregulated exploitation and by forest fires. The United States can no longer afford to ignore the inevitable consequences of forest destruction.

FORESTRY A PUBLIC PROBLEM

Forestry is fundamentally a public problem. The purposes of forestry are essentially public in character. Forestry aims to continue the growth and production of the forests for future needs and to secure those general public benefits arising from the mere existence of forests.

The production of timber differs from that of other crops in the great length of time required to grow trees of useful sizes. In the case of field crops the quickness of results makes it profitable for private owners to use good methods, as soon as these can be demonstrated to them. The forest problem is different. A private owner ordinarily purchases timber land for the merchantable stock standing on it. This represents an accumulated growth of many years, often 200 to 500 years, or even more. The usual method is to cut the merchantable timber without reference to the future. Even when not followed by fire, the treatment is often destructive. There is a popular idea that if fires are kept out a forest will take care of itself, no matter how the cutting is done. In many places a forest cover is restored sufficient to conserve quality of soil, but the productiveness of forest measured in growth of valuable species of commercial quality will not usually be maintained without special attention. Forests as handled by most private owners continually decline in productiveness. The practice of forestry involves initial investments with a view to securing larger harvests in the future. Most private owners have been unwilling to make the investment in view of the length of time required to mature the crop and the risks from fire and other enemies of the forest, and because they fear that the present system of taxing growing timber will absorb possible profits.

It is true that forestry is being practiced today by some private owners.

Many farmers are handling their woodlands with great care and intelligence, and some large private estates are also handled along the lines of forestry. Among extensive timber tracts the number which are managed with a view to continuous production of trees is very small. It is safe to say that not over one or two per cent of the lumber on the market today has been cut with a view to continued forest production.

It is a matter of history that no country has solved its forestry problem except through the direct or indirect action of the government. The progress in all countries has been in direct ratio to the activity of the government.

The public may deal with the forestry problem in three ways.

1. By public ownership of forests.
2. By assistance to private owners in taxation and fire protection, and by co-operation in management.
3. By the regulation of privately owned forests.

PUBLIC OWNERSHIP OF FORESTS

While it is not practicable for the public to own all the forests, nevertheless direct ownership or control by the public of very extensive forests is essential to the working out of the country's problem in forestry.

The public forests constitute the foundation or nucleus for the development of forestry in every country. Those countries with little or no public forests are so far failing in their forestry work. It is the universal testimony of foreign countries that the public forests are too small; and that national interests would be better served if they were far more extensive. The present areas of public forests are in all cases what was left when the policy of disposing of them to private owners ceased. All countries which have adopted a national policy of forestry are trying to increase the public holdings, not to decrease them.

PAST MISTAKES IN HANDLING PUBLIC FORESTS

It has been the policy to dispose of the public lands in the United States as rapidly as possible in order to encourage the development of the country. The acquisition of land by private individuals was made easy in order to secure settlers. The wisdom of a liberal policy as applied to agricultural lands has been proved by the rapidity with which our country has been settled. Unfortunately, the early legislators did not display the same foresight with respect to forest lands as they did with agricultural lands. It is only recently that the public has come to realize that it has been giving over to private owners lands that ought to be held in perpetuity by the public itself. Agricultural lands ought to be privately owned, but there are certain areas in mountain regions and on soils not suited for cultivation which should be kept in forest growth and just as extensively as possible owned or controlled by the public.

A NEW PRINCIPLE IN OUR LAND POLICY

A new principal has been introduced in our public land policy, namely, that there are certain classes of land whose management vitally affects the public interest and which cannot be mismanaged without grave danger of direct injury to the public. Recognizing this principle, the government has already withdrawn from sale a large proportion of the public forest lands situated in the mountains, with a view to their protection and management for the permanent benefit not only of the present but also the future interests of the public. In the same way some of the states for public protection are

now purchasing forest land which under a mistaken policy was disposed of for private exploitation.

PUBLIC FORESTS IN THE UNITED STATES

The public forests in this country are owned by the Federal government, the states, various tribes of Indians, by municipalities, and by public institutions. The total area owned by the government, the states and the Indians is shown in the table which follows. There are no adequate statistics of the forests owned by municipalities and public institutions, but the aggregate is relatively trifling.

PUBLIC FORESTS

	Area-acres
National Forests.....	192,931,197 (Gross area)
	170,368,605 (Net area)
Indian Forests.....	10,000,000 approximately
National Parks	4,562,265
State Forest Reserves.....	3,253,185

The public forests comprise approximately 25 to 30 per cent of the forested area and about 9 per cent of the total land area of the United States. The area of private forests is therefore over three times that of public forests. The total amount of merchantable timber, however, in private ownership is five times that on public lands. The reason for this is that public forests are chiefly in the mountains and comprise what was left after the best was selected and acquired by private owners.

It is interesting to compare these data with those of European countries. In some of those countries the land was disposed of to private owners in much the same way as in the United States, so that the balance actually owned by the government is comparatively small. Thus, for example, only about 12 per cent of the forests of France are actually in government ownership, and yet forestry has reached a very high state of development because all forests are practically under the direct control of the state, which guarantees that they are properly protected and managed. In Germany, while the state owns about 40 per cent of the forests, fully 66 per cent of the total forest area is under public control. In Austria Hungary,, France, Switzerland, Italy, Sweden, and Denmark, practically all the private forests are under state supervision. It is interesting to note that in Germany while private forests exceed in area the public forests, yet the amount of merchantable timber in the latter forests is about fifty per cent of the total. This means that in Germany the public forests are better stocked than private forests, which is exactly the reverse of the case in this country.

THE NATIONAL FORESTS

The national forests have been established in order that their resources may be developed under such restrictions as are necessary to protect the interests of the public dependent upon them. When they were first established there was a great deal of opposition because it was believed that they were to be closed to use and development. Their purpose is not to prevent use, but to prevent waste. The design is to replace the wholesale exploitation and destruction of the forests by protection from fires and wise use under forestry methods. It was natural that any restrictions were at first opposed by those who have always regarded the public resources as free for all. It is astonishing, however, how rapidly the people using the national forests have come to see

the public benefits of forest protection and forestry, and in most regions the opposition is being replaced by approval of the government's policy.

There is nevertheless still a very powerful opposition to national forestry and to the Forest Service. There are still many who would see the national forests entirely abolished and the old regime of unregulated exploitation of the nation's resources reestablished. This opposition to the Federal policy comes from two different sources. The first is the spasmodic local opposition due to difficulties arising in the local administration. These difficulties are usually adjusted without grave difficulty and the cause of the opposition disappears. The second source of opposition is of a more permanent character and comes from those who are fundamentally opposed to the idea of regulating the use of the nation's resources for the public benefit.

The national forest policy has received a great impulse through the passage of the Appalachian and White Mountain bill by Congress. This measure enables the Federal government to participate in the solution of the forest problem in the eastern mountains not merely through general advice to private owners, but through actual ownership and management of public forests. It is not expected that the government will be able to purchase all of the mountain areas which should be protected and handled mainly in the public interest. It will be possible, however, even with the appropriations already made, to establish a number of national forests on important watersheds which will serve as a nucleus for the development of forestry over large surrounding regions.

STATE FORESTS

The government has at different times made very extensive grants of public lands to the States. Thus in some of the states the government has, in addition to special grants, given two sections in every township, and in several states four sections in every township. It is estimated that something over nine million acres of the state lands are forested. Heretofore the policy of the public land states, except Minnesota, has been to dispose of their holdings as rapidly as possible by sale to private individuals. While in several of the public land states there is now an effort to protect the state forests from fire, but little progress has been made in the adoption of a policy of retaining these lands permanently for forest purposes. One reason why this policy has not been adopted is because the state lands are not in a solid body and are therefore difficult to administer. One of the most urgent needs is legislation which will enable the public land states to make exchanges for government lands and thereby consolidate their holdings into single large state forest reserves which can be handled with a view to permanent forestry. Bills have at various times been introduced in the Congress, looking to this result, but they have been consistently defeated, although it is obvious that both the government and the individual states would be enormously benefitted by such exchanges:

In the East just as in the West the states have disposed of their lands just as rapidly as purchasers could be found. They are now waking up to the realization that such a policy was a mistaken one and that the disposal of state lands should be confined to those of agricultural value and the timber lands in the mountains which must be handled conservatively for the protection of the public should be reserved in public ownership. The states are now beginning to recover by purchase those lands which should never have been parted with. There are now about three million acres of state forest reserves, distributed as follows:

Indiana	2,000	acres
New York.....	1,641,523	"
Pennsylvania	920,763	"
Michigan	231,349.58	"
Massachusetts	2,000	"
Connecticut	1,509	"
Maryland	1,960	"
New Jersey.....	13,720	"
Wisconsin	385,000	"
Vermont	1,760	"
Minnesota	51,000	"
Kansas	600	"
Total	3,253,184.58	acres

PUBLIC ASSISTANCE TO PRIVATE OWNERS

Forestry in this country will not be entirely solved merely by public ownership. Even with a considerable extension of the national forest system and with the establishment of large state forests, the amount of private forests will undoubtedly exceed that publicly owned. One of the most important problems, therefore, is that of the practice of forestry by private owners.

There are a number of ways in which the public, which has so great an interest in bringing about the practice of forestry, may contribute to help the private owner in overcoming certain difficulties which he faces in practicing forestry. This assistance must come primarily from the state and not from the Federal government. The Forest Service has authority to aid private owners through advice in methods of handling woodlands, and indirectly its investigations in methods of forestry are of great benefit to the private owner. In a limited way, also, the government is now assisting private owners through co-operation with the states in the protection of lands on important watersheds of navigable rivers. In general, however, the assistance to private individuals must be worked out by the states.

The most important duty of the states in this regard is the protection from fire. A number of states have recently taken an advanced position in this matter and have not only passed effective forest legislation, but have provided for the organization of fire patrolmen. It is not proper that the state should bear the entire burden of protecting private property, but it should furnish the machinery which will enable the proper organization of fire protection in co-operation with private owners. The reduction of the fire risk removes the greatest obstacle in the way of forestry. The second inducement for private forestry is the introduction of a fair system for the taxation of growing timber. The state may, further, render to private owners direct advice and assistance in methods of conservative handling of forests.

PUBLIC REGULATION OF PRIVATE FORESTS

The question has already come up in a number of states whether the public should place restrictions on the handling of certain classes of land in order to prevent injury to the public. I have already mentioned the fact that in most European countries there is a measure of public oversight of the management of private forests.

In many states there are already laws regarding incendiarism and responsibility for setting fires by carelessness or accident. In several states there are restrictive regulations regarding the use of fire in burning brush and clearing land, and in some laws have been passed regarding the disposal of brush after

logging. The position of the state is that a private owner should use reasonable measures to dispose of refuse after cutting when its presence is a menace to the surrounding country. I believe the time has passed when a private individual can handle his property in such a way as to subject his neighbors to the danger of great loss and the general public to serious damage.

The great danger is that laws will be passed which are so rigid as to be impractical of application. Any law touching the disposal of brush after logging or in other ways making restrictions with reference to fire protection, should be sufficiently elastic to meet the varying requirements of different forest conditions. A further difficulty in such restrictive legislation is that the tendency is to merely pass the legislation and not provide the proper machinery for its practical application. The work of reducing inflammable debris in the forests, the work of fire patrol and other measures of fire protection, must be worked out through co-operation between the private owners and an organization of competent state foresters. The state of New Hampshire has made a splendid beginning by establishing a forest organization and the private owners have shown their wisdom in uniting to introduce practical methods of fire protection.

There are certain areas on steep slopes of important watersheds where it is essential to protect the forest from destruction. I do not mean that no cuttings whatever should be made on such areas, but such cutting as is done must be of a character which will not result in public injury. In a number of state legislatures bills have been introduced looking to the designation of protection forests with a view to placing reasonable restrictions on the cuttings, in order to prevent complete deforestation and to guarantee a restocking of such areas as are cut over. This is a problem which is coming more and more to the front as the effects of complete deforestation are felt.

This is a problem which must be handled with the greatest wisdom. Some of the proposals which have been made are not practical in their application and would not secure the results desired. In working out this and other phases of private forestry, I would seek first the cooperation of the timberland owners themselves. If they are wise, they will see the importance of such co-operation, as a means of forestalling restrictions. In many cases they can introduce at once, if they will, measures of forestry which will fully meet the requirements of protection of the mountain slopes and watersheds. This is especially the case when they have the active assistance of the public in fire protection and in removing other obstacles which render forestry difficult to them. When the public has done its reasonable share, if timberland owners fail to introduce methods which accord with the public interest, they will have only themselves to blame for enforced regulations which they may regard as unfavorable to their private interests.

I have been continuously urging the public to meet its obligations in forestry. I have been urging also that private owners make a beginning in the practice of forestry, even though at first it is experimental, until each owner can determine how it may be worked out under the special conditions under which he is working.

I believe that ultimately there will be some public direction of the work of forestry on certain classes of mountain lands, just as is now the case in Europe. We are now endeavoring to handle the problem through the introduction of private forestry in co-operation with the states and the government.

THE SIHLWALD

An Example

BY BARRINGTON MOORE, M. F.

THE first stage of the forestry movement in the United States has been characterized chiefly by efforts toward preventing forest destruction. A campaign was waged with such fierceness that there was danger of forgetting what forestry means to substitute for destruction. The following article is a single example of what forestry accomplishes, perhaps not for many years in the United States, but in a part of Europe where it has long been recognized and where most conditions are favorable.

In Switzerland less than twenty miles from Zürich lies the Sihlwald. This forest is on a river, the Sihl, which flows into Lake Constance; it belongs to the city of Zürich which itself controls the entire management. This forest has only approximately 2,560 acres, small as compared with forests in the United States, but of considerable importance.

The first cutting in this forest was in 1250, over 760 years ago. There was then no forest management, but a crude regulation, because cutting has been on the same rotation (period of years between the formation of a piece of forest and the time it is cut) ever since. The first actual management of the forest dates from 1802, and the first working plan was not made until 1845. Therefore, if we in the United States, where the word forestry less than ten years ago meant nothing, have as yet almost no working plans, we need not be discouraged.

The climate of the region is very much like that of northern New England, only slightly colder; the chief controlling factor, precipitation, is about the same, approximately 56 inches; heavy snows, causing considerable damage in the forest have been known as early as September 28th and as late as May 23rd.

The forest is composed chiefly of beech: This species forms 70 per cent of the total stand; ash and maple (three kinds of maple) form 15 per cent; and the remainder is made up of conifers, chiefly spruce, with some silver fir, larch and a little Scotch pine. The rock is a soft brown sandstone, largely decomposed, and covered with many glacial moraines and gravels. The soil is sandy with enough clay to prevent too great porosity, and with abundant moisture.

The management of this forest will be of great interest to all who know or care anything about forestry, whether technically trained or not. In the first place there is an excellent topographic map on a scale of 1 in 2,000, or approximately 6½ inches to the mile, large enough to include an abundance of valuable detail; with a contour interval of two meters (about 6½ feet); the important forest types; and also the working circles and compartments.

A working circle, as everybody knows, is a part of any forest tributary to a certain market, and from which a sustained yield of timber is obtained. Part of the working circle is cut each year until the whole has been covered; by the time the last part has been utilized the first part is ready to be cut again.

A compartment is here a subdivision of a working circle used for convenience in regulating the cut. In the Sihlwald there are four working circles. The two principle ones (that is, the oldest and most productive) are situated on a long slope with a village at each end; each working circle supplying one of the villages. Of the other two working circles, one consists of newly acquired land along the same slope only further down stream, while the second is across the river, comprising an irregular forest on a steep rocky slope with a considerable proportion of conifers.

The rotation aimed at for the forest as a whole is 110 years. But certain conditions on each working circle prevent this: On working circle number I (compartments 1 to 8, inclusive) it is 90 years, because in 1845 the forest on 100 to 125 acres was destroyed by a heavy snow, and is now being worked back to normal; on number II (compartments 9 to 16, inclusive) it is 110 years, which gives beech of 40 to 50 centimeters (approximately 15½ to 19½ inches) in diameter at breast height; on number III (compartments 17 to 21, across the river) where there are many conifers but an irregular stand, it is 100 years; on number IV the newly acquired "Forst" comprising six compartments with considerable silver fir and Scotch pine, it is 100 years.

The silvicultural system is one which, in the East, could profitably be made use of in some of our easily reproduced hardwood stands, such as more or less pure stands of hard maple, beech, or mixtures of yellow poplar and oaks. Technically, it is known as the shelterwood compartment system without preparatory cuttings, and, in spite of its name, is comparatively easy to carry out.

The first step, when the stand has reached maturity (this could be almost any age desired by the owner, provided the trees are old enough to produce good seed, are more or less even aged, and form a pretty full stand) is to make the first cutting: this is a heavy thinning which gives light enough for the seed to germinate, and, in this case, removes about 30 per cent of the total volume. It goes without saying that the poorer trees are taken and the thriftier ones left for growth. After a four or five years' interval when the reproduction is old enough to begin to suffer from the shade of the older trees, a second cutting is made by which another 30 per cent of the volume is removed, leaving only the thriftiest trees which will make a very rapid growth in diameter, and which will also protect the reproduction. Of course, the length of this period, in Europe and in America as well, will vary with the species handled and with the site quality: on good soils with rapidly growing species it will be much shorter than on poorer soils with a slower growing species. It will also vary with the severity of the first cut. If the first cut has been very heavy, it will not be necessary to return so soon; but on the other hand there is the danger, if the cut is too heavy, that the soil will be unduly exposed to drying out or to the entrance of weeds and brush which will prevent reproduction. The third and last cutting is made three or four years later. At that time the blanks which occur on account of partial failure of natural reproduction are planted with spruce wherever the soil is sufficiently favorable (which is almost everywhere); and wherever it is unfavorable these spots are planted with alder and underplanted with spruce in the protection of the alder. Thus at the last cutting a forest about 12 years old is left on the ground.

The tending of this forest is the next point of interest which may offer some general suggestions for the management of similar woodlands in the eastern United States. When the stand is 15 years old they make a "cleaning" to regulate the mixture and give the more valuable species, such as the ash, spruce, etc., a chance against the beech. In Switzerland the demand for forest



A FIFTEEN TO TWENTY YEAR OLD STAND OF BEECH BADLY DAMAGED BY THE HEAVY SNOW OF MAY 23, 1908. (JUST TWO MONTHS BEFORE THE PICTURE WAS TAKEN). THE DEBRIS ON THE GROUND IS FROM THE BROKEN TOPS



A GENERAL VIEW OF PART OF THE FOREST. LOOKING ALONG A LINE BETWEEN TWO COMPARTMENTS: A BODY OF MATURE TIMBER ON THE RIGHT; DIRECTLY BESIDE IT ON THE HILL IS A PATCH CUT AND REPRODUCED AFTER THE SNOW BREAKAGE OF 1885. ON TOP OF THE HILL ON THE EXTREME LEFT IS A STAND NEWLY OPENED UP FOR REPRODUCTION. IN THE FOREGROUND IS NATURAL REPRODUCTION OF BEECH WITH SPRUCE PLANTED IN THE OPENINGS



THE SAWMILL AND TREATING PLANT. IN THE RIGHT FOREGROUND ARE SPRUCE POLES BEING TREATED BY THE BOUCHERIE PROCESS; THE COPPER SULPHATE COMES FROM THE TANKS ON THE BUILDING IN THE BACKGROUND. THIS BUILDING CONTAINS THE TURNING LATHES, EXCELSIOR MACHINE, AND CORDWOOD SPLITTER. THE LOW BUILDING ON THE LEFT IS THE SAWMILL. IN THE LEFT FOREGROUND MAY BE SEEN THE CANAL BY WHICH THE WATER IS DIVERTED FROM THE RIVER TO GIVE THE POWER

products is so great that the results of these cleanings are sold for fuel even down to the smallest twigs, something which will be possible nowhere in America. At twenty years the stand is thinned again by the removal of all forked, ill-formed, suppressed and sub-dominant trees, and the mixture regulated. One thinning at this age gave as much as 160 cubic feet (the equivalent of over two stacked cords) of fuel wood per acre. The result is, of course, rather an open stand; but the trees are young and vigorous and soon form a close canopy.

When the stand is between twenty and fifty years old thinnings are made whenever needed to increase the growth of the stand, generally every five to seven years, though this, of course, varies with the quality of the soil and the aspect. It has been found that aspect, on the the Sihlwald, has more effect in increasing growth than has the quality of the soil, growth being most rapid on south exposures. But it is only in climates with abundant moisture that the southern exposures are favorable; for wherever moisture, though it may be sufficient for tree growth, is less ample than here the south slopes will probably be the unfavorable, rather than the favorable, ones.

When the stand has passed fifty years of age, thinnings are made less often, only every ten years, because growth is slower.

The golden rule in thinnings, whenever market conditions will allow, is to make them light and often, rather than heavy and at long intervals. This is particularly important on the poorer sites.

Advance reproduction that occurs before the stand is sixty years old is cut back because it is generally suppressed and crooked; that occurring after sixty years is left.

The yield obtained from the Sihlwald is well worth considering as showing what very intensive management, coupled with favorable conditions, can produce. On an average for the forest as a whole the yield from thinnings alone is approximately 10 cubic feet per acre per annum. The increment is 32 cubic feet, an equivalent of approximately 230 board feet. For comparison it may be stated that the increment under moderately favorable conditions in some of the Rocky Mountain forests in the United States is 100 board feet per acre per annum, and less.

An interesting point is the servitudes or free uses on this forest. Being such an old forest, and belonging to a large city, one would expect to find innumerable rights of users. On the contrary, no servitudes exist; whether they had never been allowed to grow up, or had been bought out, or had been merely abolished by law, could not be determined. At any rate the nearest approach to rights of user is the gathering of dead wood by the poor people once a week (every Wednesday); but, since they must buy a permit, costing one dollar per year, for this privilege, it cannot be considered a right of user. It is also of small value, since the utilization is so close that there is very little dead wood left to gather.

In the utilization of its resources the Sihlwald sets an example worth following for forest owners situated under equally favorable market conditions. The important point is that the city, instead of selling stumpage, as many owners in the United States are now compelled to do, does all the exploiting itself; it not only fells the trees and hauls them out, but actually saws them up into finished lumber, and even makes tool handles and excelsior.

All cutting, even in thinnings, is done after the leaves fall and before January. The logs are hauled out on the snow or on a narrow-gauge tramway run by gravity. The products of the thinnings are worked up in summer on the ground. They have devised a most ingenious scheme for extracting cordwood. Slides are built of parallel poles 4 to 6 inches in diameter, the cordwood is

loaded onto a sled which goes down one of the slides by gravity and, as it goes down, pulls up an empty sled on a parallel slide by means of a thin cable attached to both sleds and passing through a pulley at the top of the slides. This is done in summer as well as in winter.

The demand for wood is so great that even cordwood is sold by classes, as follows: (1) split and stacked; (2) large faggots about 2 inches in diameter (some of them split) made up into short bundles 8 to 12 inches in diameter; (3) small faggots, all the small branches worked up into neat little bundles.

They have their own sawmill on the River Sihl run by water which gives them approximately 100 horsepower. The logs are sawn on a band saw, generally to special order. Then there is a cut-off saw for cordwood billets and a splitting machine; an excelsior machine; a narrow band-saw for cutting out tool handles, implements, etc., and a turning lathe. In addition they have an impregnation plant for treating large timbers, generally spruce and beech poles, by the Boucherie process (copper sulphate), and a small dry kiln for boards and excelsior bolts.

The organization necessary to carry on all these operations is worth notice. The entire administration centers in the Department of Finance of the City of Zürich. The forest itself is in charge of a forstmeister, a man of standing not only in the profession and community, but in the country at large; he was at one time a general in the Swiss army, and president of the Conseil d'Etat, virtually President of the Swiss Republic. Under the forstmeister is a forstadjunct, corresponding to the deputy supervisor and forest assistant in the United States Forest Service. Under the forstadjunct are three clerks: the first for forest management; the second for the impregnation plant; the third for the sawmill. Then there are four forest guards, one for each working circle. In addition they have a force of one hundred permanent laborers paid by the day or month, and an extra force doing piece work.

The financial returns from this, one of the most highly developed examples of forest management in the world, will certainly interest the American reader because the first question which the forest owner asks of the forester is "Will it pay?" If not, it is useless to ask any one but a philanthropist to practice it; and forestry must not become synonymous with philanthropy.

In 1907, an average year, the net receipts from this small forest of approximately 2,560 acres were \$19,656.80, or a revenue of \$7.69 per acre.¹

But it would be wrong to point to this handsome revenue without showing the expense necessary to the production of it. For it is time that the public who, with the best intentions in the world, clamor for the practice of forestry by states and private individuals, should realize that forestry costs money, often a great deal more money than is justified. In the Sihlwald the expenses, excluding interest charges, were \$89,897; when we add a heavy interest charge² this becomes a considerable sum to spend on a small forest in a single year. The moral is that to get money one must pay out money in forestry as in everything else.

The example given by the Sihlwald is one which, in the United States, it will be impossible to follow on a large scale for many years to come. However, it should not be long before it can be applied, by owners possessing the forests and the means, to smaller tracts in the East. Meanwhile it shows what forestry is aiming at and hopes some day to accomplish.

¹The figures are always kept on the basis of hektars (2.5 acres) and francs (20 cents). There will be a slight error in converting to acres and dollars because a hektar is not exactly 2.5 acres nor is a franc exactly 20 cents. The figures are, however, close enough for all practical purposes.

²This charge could not be ascertained.

FOREST SCHOOLS IN THE UNITED STATES

III

University of Nebraska Forest School

BY O. L. SPONSLER
PROFESSOR OF FORESTRY

IN THE fall of 1903 the University of Nebraska established a Department of Forestry. The demand of many for a general knowledge and of a few for a technical training in forestry furthered by the urging of

Benjamin E. Andrews, the chancellor at that time, and Dr. Chas. E. Bessey, brought about the desired result. Courses in forestry were organized and a group of required subjects were recommended to cover four years' work in the university. At the present time the full amount of forestry work extends over a period of five years. At the end of four years of satisfactory work a degree of Bachelor of Science in Forestry is granted. An additional year of certain required work entitles the candidate to a degree of Master of Forestry provided he has had a year's practical experience in field work. The degree is not granted until this last provision is complied with.

In considering the schedule it was thought best to have the work so arranged that the student must take at least one course in forestry each year. The first year student, by taking a general course, is given an insight into the subject he intends to make his life work. The interest thus started is kept up in the second year by making a detailed study of the important species of trees; in the third, by investigating the use of the many products of the forest, and the methods and costs of obtaining them. In the senior year the more technical forestry work is studied, that dealing with the measurement and production of the forest crop; and in the

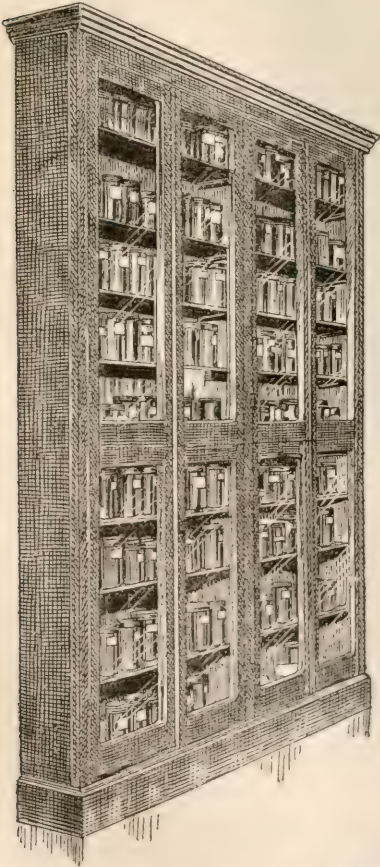


FIG. 1. WORKING COLLECTION OF FOREST TREE SEEDS

post-graduate year the matter of handling the forest according to good business methods is accompanied by a study of the policy of the nations in caring for their forest resources. During the past seven years the working of the schedule has been watched closely and a few changes have been made to bring about a more logical and efficient sequence of studies. The correlation of subjects may be shown best by considering various courses as they pass from one year to the next constituting more or less closely related groups.

Botany forms, perhaps, one of the strongest groups in its progression of courses. In the first year the structure of plants in general and a survey of the plant kingdom from the lowest forms through the flowering plants is studied. This is followed in the second year by the principles of classification of the flowering plants, with special stress laid on a study of the grasses. After this



FIG. 2. ONE SECTION OF DRAWERS CONTAINING A WORKING COLLECTION OF CONES

acquaintance with the plant families, the student, during the next two years, takes up work on the functions and life processes of various parts of plants, the structure and development of tissues and lastly the relation of plants to their environment. A great deal of attention is paid to botany, especially systematic and ecological, for it is felt that a good foundation in these subjects as well as in physiology and anatomy, is well worth the time of the forester.

The relation and sequence of courses leading to the advanced work in forestry may be shown in two groups. One, with forest mensuration as the climax, includes physical geography, mathematics, and lettering and drawing in the first two years as preparatory to surveying, which is followed by forest mensuration in the fourth year. The other group, with a rather complex course in silviculture at the end, comprises a number of courses not closely related to each other but all needed for the final work. The fundamental subjects in chemistry, geography, physics, entomology and botany are given

in the first two years; while the more advanced work in plant physiology, a study in the tissues of woody plants, and a lecture and laboratory course on the origin, nature, and properties of soils, is given in the third year just preceding the study of silviculture.

Preparation in rhetoric includes six courses covering three full years.

In addition to this, reports on various forestry subjects are required throughout the whole undergraduate work, besides a thesis in the fifth year. Many of the themes given in the rhetoric courses are corrected in the Forestry Department for scientific accuracy and in the Rhetoric Department for English.

It is only through the harmonious relations of the various departments and colleges that the sequence of courses is made valuable. The College of Engineering has granted special courses in drawing, timber, physics, and surveying, which are adapted to the needs of the forester only. Departments of Zoology and Entomology offer courses which apply to the forests from economic viewpoints. Several courses in botany have been inaugurated especially for foresters; among them are included a course on the development of the tissues of woody plants, a study of the structure of important woods with relation to their identity and their



FIG. 3. PART OF THE FOREST FUNGI COLLECTION

physical properties, courses in forest ecology and forest mycology.

The apparatus for laboratory and field work in the Forestry Department is closely interwoven with that of the Botany Department. The well-equipped laboratories and green houses, and the herbarium of about 300,000 specimens belonging to the Botany Department are thrown open to the use of the foresters. In addition to these concessions, the Forestry Department maintains a separate green-house for experimental classwork and a number of working collections of various parts of forest trees.

For the study of woods there is a type collection of all of the important and a great many of the minor species, labeled and placed where they are readily accessible to the students. Independent of this a working collection of all of the economic woods is maintained, containing twenty-five to fifty specimens of each kind, for use in identification and study of structure. Many sections of the logs of our timber trees allow the student to investigate the structure and growth of bark, sap-and-heart-wood and annual-rings. The woods laboratory also contains collections of stained and variously finished

specimens, cypress knees, enormous burls, and samples of special uses of trees such as ship-knees. It is equipped with the necessary apparatus for sectioning and macerating specimens, with compound microscopes and large charts illustrating sections of various woods. Each student is assigned a locker where his individual assortment of woods may be kept unmolested.

For use in dendrology there are three separate working collections; seeds, cones and a leaf and twig herbarium. The seed collection contains samples of about two hundred species, nearly a third of which are conifers. The seeds are kept in screw-top glass jars containing on an average a half-pint of each kind. The cone collection is kept in herbarium cases fitted with drawers of two sizes. It contains from twenty-five to several hundred cones each of over seventy-five species. These collections are for the use of the student who is required to dissect and study both seeds and cones. The leaf and twig herbarium is also a working collection, and is quite independent of the large botanical herbarium mentioned above. It contains mounted specimens, about fifteen to twenty each, of the more important trees of the United States. Over two hundred species are represented.

A collection of about one hundred fungi important to the forester is made available for study in forest mycology by allotting species to drawers similar to those used for the cones. Here wherever possible a section of the wood and bark accompanies the fruiting body.

Exhibits of logging and saw-mill tools, samples of the results of many methods of close utilization of woods, stereopticon slides and enlarged photographs are used to illustrate lectures on logging, lumbering and methods of manufacturing forest products.

For use in forest mensuration, laboratory and field, an assortment of instruments for both accurate and rough work is provided. Included in this are instruments for mapping and for measuring heights, diameters, and volumes of logs and trees. They are of various makes and patterns giving the student a chance to compare the merits of one with the other. About forty complete stem-analysis sections are provided for volume and growth studies.

In order to show the difference between seedlings grown in various regions and between different grades in the same region, several hundred specimens have been mounted on herbarium sheets and these filed in cases where they are readily available. Two hundred and fifty stereopticon slides are used to supplement the lectures on nursery work and planting.

The post-graduate year demands original work in at least two courses. To this end, a research room is well equipped with the apparatus and materials that are needed. The Botanical Library, which is one of the very few complete technical libraries of this kind in the United States, is open to the post-graduate. The Forestry Library contains a complete set of all the Forest Service publications, card-indexed according to subject-matter, many English, German, and French volumes on Forestry subjects, a set of files containing several thousand bulletins, circulars, and clippings from lumber and forestry journals. All of the material in the library is made usable by means of the card index system. The subjects are listed in a very simple way so that every item is available to the student and can be obtained at a moment's notice.

For experimental field work the department has fifty acres of plantations of various species growing under many conditions. A one-acre nursery is provided with water system and with concrete seed-beds for special lines of experimental work. The university is located only a few hours' ride from the Government Nursery at Halsey, Nebraska, where the students may have an opportunity of inspecting tree-growing under very exacting conditions. Every two years the upper classes spend three or four weeks in northern

Wisconsin making a study of logging, milling and manufacturing methods of both the hard-woods and the soft-woods. Every year the dendrology class spends a short time at the arboretum of the late Honorable J. Sterling Morton and in the forest growth along the Missouri River.

In order to stimulate individual work in research, to give the student experience in publishing articles and furnish a ready means of putting valuable little scientific items on forestry into print, the Forestry Club puts out an annual publication of about one hundred pages. The author of each paper is afforded the chance to supervise all of the steps of proofreading and corrections incident to the printing of his article.

The graduate work includes, besides the forestry subjects taught in the class-room, a course in research on some forestry problem and a thesis, also on a forestry problem. A final year's work in rhetoric is required in which the themes are based on forestry subjects. These courses give the candidate a chance to become well acquainted with the literature on forestry besides giving good practice in writing. In addition to the required university work the candidate must have had at least one year's practical field experience along forestry lines. This experience may be obtained by using the vacations of four summers or by remaining a solid year in the field. The

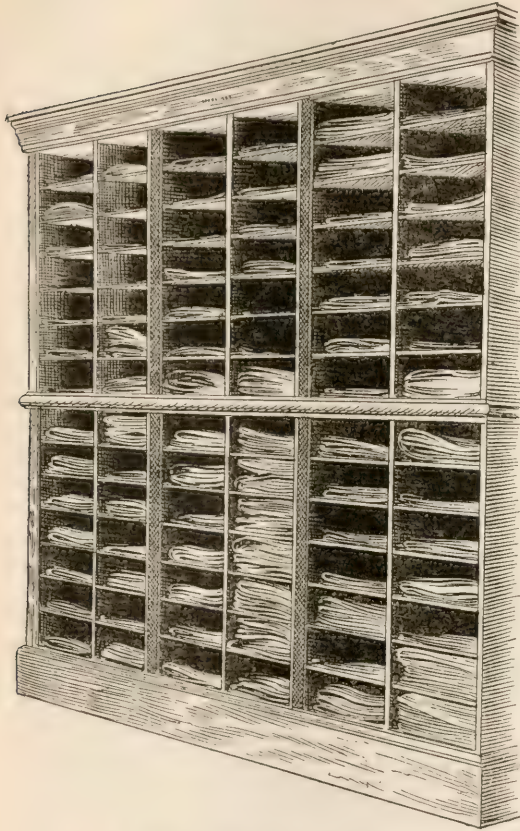


FIG. 4. FOREST TREE SEEDLING HERBARIUM

location of the University of Nebraska is such that this ruling is not a hardship to the candidate, for, the Lake States, the Ozarks, the Colorado Rockies, the Black Hills are not far from Lincoln, and are about equally distant, while but a short distance farther the Southern Pineries, the Southwest or the Idaho-Montana region is reached.

Provision is made in the graduate school for inter-changing majors and minors between forestry and several other departments, giving the graduate student an opportunity to specialize in many lines. For instance, he may combine forestry with grazing, pathology, entomology, or engineering.

FOREST SCHOOLS OF THE UNITED STATES

IV

Colorado School of Forestry

BY P. T. COOLIDGE, M. F.

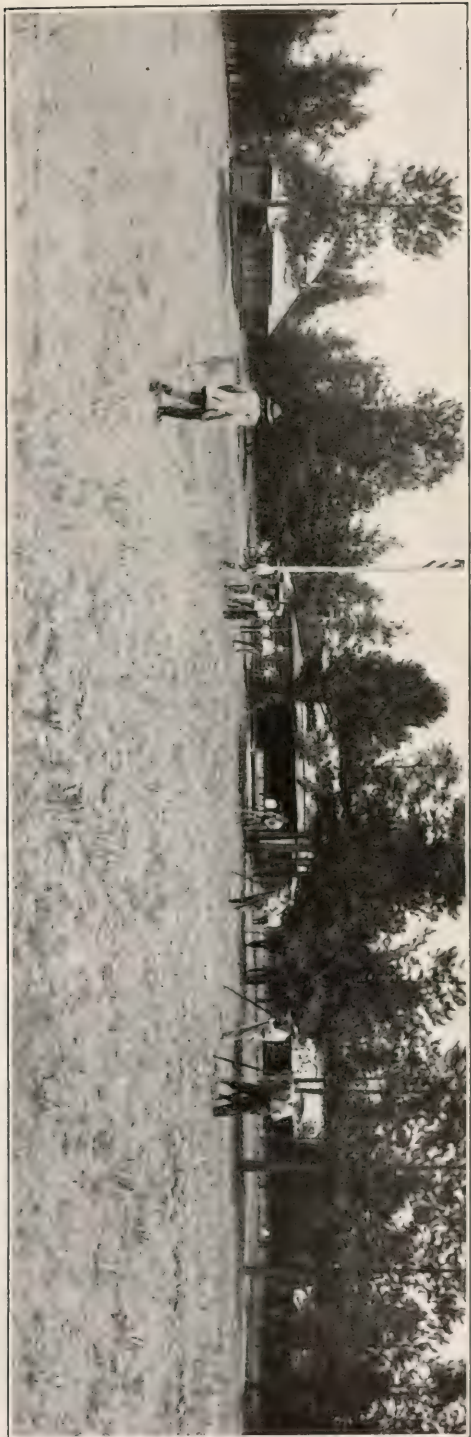
DIRECTOR OF FORESTRY

LOCATED in Colorado Springs, Colorado, at the doors of the western national forest region, is the Colorado School of Forestry, a department of Colorado College. The school was founded in 1905 through the generosity of General William J. Palmer and Dr. William A. Bell, who presented to the college for a field laboratory in forestry a tract of timberland of 10,000 acres, known as Manitou Park. This tract is about twenty-five miles from Colorado Springs, in the mountains north of Pike's Peak. The Colorado Midland Railway, which runs about seven miles south of it renders it very accessible.

The park is about two-thirds timbered, principally with Western Yellow Pine. The forest has a small admixture of Douglas Fir, and the other important Rocky Mountain species such as Engelmann Spruce and Lodgepole Pine grow on the Pike National Forest, which borders the park on three sides. The forest at Manitou Park is largely mature or has been lightly culled by early lumbermen. A working plan for the tract was prepared by students in the spring of 1910 and this is being carried out by the following classes with whatever modifications and additions seem desirable as the result of more detailed study. Logging and sawmilling are carried on during most of the year by contractors who purchase stumpage. The markings of trees to be cut is done by the students and they are thus given opportunity to direct conservative lumbering and to study logging and milling. The tract is therefore being managed so that it is a valuable object lesson in practical forestry. The summer courses in the School of Engineering of Colorado College as well as in the School of Forestry are conducted at Manitou Park, the students living in a group of cottages called Camp Colorado, located in the pines.

The courses offered by the Colorado School of Forestry are a four-year undergraduate course leading to the degree of forest engineer and a two-year graduate course leading to the degree of master of forestry. The first two years of the undergraduate course are devoted to general academic studies: Languages Mathematics and Science given in the Liberal Arts and Engineering Departments of the college. The last two years are devoted to technical forestry. The courses given in these two years aim to give complete training to men who wish to become technical foresters. The undergraduate course prepares for any branch of forestry, but on account of the school's proximity to the national forests, it is particularly well suited to fit men for employment by the Forest Service on these national forests. By frequent trips of inspection it is possible for students to obtain direct instruction in the work on the national forests such as timber-cruising, timber sales, planting and nursery work, grazing, special uses, and other phases of the work.

The two years' graduate course is intended for students who wish to



FOREST SCHOOLS OF THE UNITED STATES—IV.

CAMP COLORADO, MONTICOU PARK



STUDENTS MARKING TREES TO BE CUT. VIRGIN WESTERN
YELLOW PINE FOREST, MANITOU PARK, COLORADO



FOREST SCHOOLS OF THE
UNITED STATES-IV.

CONSERVATIVE LUMBERING, MANITOU PARK. MATURE
TREES REMOVED LEAVING YOUNG TREES FOR FUTURE
CROP. BRUSH PILED FOR BURNING ON ACCOUNT OF PROX-
IMITY OF HIGHWAY

specialize in forestry after a general academic or scientific course. The program of studies is like that of the last two years of the undergraduate course.

Instruction in the field is an important characteristic of all courses in the Colorado School of Forestry. The summer courses in Surveying, Forest Mensuration, and Silviculture occupy twelve weeks. The summer work is divided between two summers, beginning early in June and lasting into July each year. In the undergraduate course, for example, students do their summer work at the end of freshman and sophomore, or sophomore and junior years, as they choose. The summer courses are open to such special students as have sufficient preparation. In the fall of the final year in forestry, a trip of about two weeks is made to inspect some large lumbering operation, generally on the national forests. After the first of April of the same year, the students are transferred for mapping, estimating, and preparation of working plans either to the Manitou Park tract or to the national forests. Day and half-day trips are made frequently throughout the year in connection with the courses in Silviculture, Forest Extension, and others.

In addition to the courses in technical forestry described above, the Colorado School of Forestry gives a ten weeks' Ranger Course in co-operation with the Forest Service. This kind of instruction is of great value in giving the men who are actually engaged in the protection of the national forests a general idea of the principles of forestry. It is given during the winter, when the national forest rangers find field work out of question in most places on account of the snow. It consists of two or three weeks of lectures at Colorado Springs, followed by several weeks of field instruction at Manitou Park. As the altitude at Manitou Park is only about 7,500 feet, the winters are fortunately very open.

The enrollment in the undergraduate course numbers thirty to thirty-five. The graduate course was established only last spring (1911). The instruction in the undergraduate course began in the fall of 1906. The enrollment in the last session of the Ranger Course was sixty, but as the plan of detailing the men on pay, then in vogue, is now considered illegal, it is probable that numbers at the next session will be considerably smaller.

The faculty of the Colorado School of Forestry consists of the professors and instructors in Academic and Engineering courses in Colorado College and two technically trained instructors in Forestry.

Other advantages of the Colorado School of Forestry are the Fremont Experiment Station of the Forest Service about seven miles from Colorado Springs, the Monument Nursery on the Pike National Forest, a school forest nursery and greenhouse in Colorado Springs, and a wood-testing laboratory. At the Fremont Experiment Station, silvicultural and meteorological studies are being conducted by the Forest Service. In the wood-testing laboratory is a 100,000-pound Riehle machine for tension, compression, shearing and transverse tests.

The students conduct a Forestry Club which meets fortnightly. It is possible for Forest Service officials, located on the national forests near Colorado Springs, as well as other experts, to address the club frequently on various matters pertaining to forestry. The club serves to hold the interest of the underclassmen in the years when they feel that mathematics and general science are not as interesting as forestry and it also gives valuable hours for discussion of technical questions.

The school enjoys a wide reputation and is growing rapidly. Men who have come to it, as about one-third of the students do, from east of the Mississippi, feel that they are getting a true taste of their future work when they are called upon to help put out fires on the nearby Pike National Forest.

TEACHING FORESTRY BY PICTURES.

THE fondness of children the usefulness of for pictures is proverbial, and pictures as an educational device is recognized by all teachers. Many a child has received through the medium of pictures, lessons which it never would have learned otherwise. Some minds receive impressions through the eye much more readily and retain them more faithfully than through any of the other senses. Thus pictures often do what oral instruction fails to accomplish.

Seeking to take advantage of this faculty of the child mind, and to teach in a novel and interesting way the lessons of the usefulness of forests and the necessity of forest conservation, the United States Forest Service has recently prepared a traveling exhibit of photographs for circulation among schools and libraries. This exhibit is sent free of charge, except that the institution to which it is sent is asked to pay the transportation charges. These are not large, since the whole exhibit, when packed for shipment, weighs about 15 pounds.

There are 44 large pictures in the exhibit, arranged in 11 sets, the four in each set all bearing on a single general topic. Each picture has a descriptive label attached to it, so that the entire set of 44 pictures, with descriptions, makes up a sort of illustrated serial story about the forest.

The following are suggestive topics, each of which is illustrated by a series of four pictures:

"Forest Fires."

"Lumbering."

"Forest and Water Supply."

"How the National Forests Are Administered."

"How the National Forests Are Used."

The photographs are mounted in such a way that the whole exhibit can be easily and quickly hung on the wall for display and as easily taken down. Each set of four pictures is fastened on a strip of green denim cloth, 16 inches wide and 4½ feet long. In the upper corners of these strips of cloth are large eyelets by which the strips may be hung on hooks or nails or suspended by cords or wires. The whole exhibit, when displayed, covers a wall space 16 feet long and 4½ feet high.

Any school, library, or other educational institution desiring to secure this exhibit should write directly to the Forester, Washington, D. C., stating about what date the pictures are wanted. The usual period for which they are loaned is from one to two weeks, though this time will be extended on request if the demands for the exhibit are not too pressing elsewhere. Teachers of geography, agriculture, and manual training will find this exhibit extremely interesting and helpful. They have also been used with gratifying results by women's clubs and similar organizations on the observance of special "forestry" days.



FOREST SERVICE EXHIBIT

TEACHING FORESTRY BY PICTURES—PLATE I.



TEACHING FORESTRY BY PICTURES—PLATE II.

FOREST SERVICE EXHIBIT

FOREST SCHOOLS OF THE UNITED STATES

V

Forestry at the Iowa State College of Agriculture and Mechanical Arts

By G. B. MAC DONALD

ASSOCIATE PROFESSOR IN CHARGE OF FORESTRY

THE Iowa State College at Ames is situated thirty-eight miles north of Des Moines at the junction of the north and south branch and the main double track line of the Chicago and Northwestern Railroad running between Chicago and Omaha. Ames is easily accessible from all directions. The college has a very delightful and healthful location on high rolling land, bordering the city of Ames on the west. The electric line of the Fort Dodge, Des Moines and Southern Railway has a station on the campus and gives two-hour service both to and from Des Moines, as well as thirty-minute service between the city and the college. The college land comprises 1,200 acres, of which 125 are devoted to campus. In laying out the campus years ago, the natural landscape effect was preserved and today the grounds present the appearance of a spacious park dotted with groups of evergreens and deciduous trees. Near the middle of the campus, the Central and New Agricultural Buildings have been erected at a cost of \$375,000 and \$350,000 respectively, adding in their beauty and stateliness to the attractiveness of the campus.

The Iowa State College of Agriculture is well equipped for giving the student thorough training in the basal sciences which will serve as a substantial foundation for technical training and practical work in forestry. As a division of agriculture, forestry is well placed in the Agricultural College, where the fundamentals of the science are given special emphasis.

Forestry instruction has been given since 1877 when Mr. J. L. Budd was elected Professor of Horticulture and Forestry. From the elementary instruction given at that early date the work has been increased to the present status comprising 550 hours' lecture and class-room work and 525 hours of field and laboratory in forestry subjects in addition to the basal and allied branches. The course is undergraduate and requires four years for completion. It is designed to give the student as much practical experience as possible along with the class and laboratory work. The college year beginning in September and ending in June, is divided into two terms of approximately four months each. During the summer months the students find employment in national forest work or in lumber camps where they are able to observe and practice present day forestry. College credit is granted to students engaging in practical work provided such work is taken up through the direction of the department and a detailed report of merit submitted.

Most of the technical work in forestry comes during the last two years of the course. In the first year only one forestry subject is given, elementary

in character, and required of all students in the Agricultural Division. The first two years of the course are arranged primarily for giving the student adequate fundamental training in those branches which should be completed before the more technical subjects in forestry are attempted. The course in Farm Forestry is designed especially to meet the needs of the Iowa farmers. Attention is given to the influence of forests in the modification of climatic conditions with special reference to the effect of windbreaks in agricultural districts. The production of fence posts, poles, lumber and fuel on the farm is considered in the study of prairie woodlots. A part of the course is given over to work regarding the utilization of the poorer classes of timber especially in connection with preservative treatment. In addition a general survey of the field of forestry is included which makes the course of more interest to regular students of forestry.

TECHNICAL FORESTRY SUBJECTS

First year	Farm Forestry.		
	<i>First Term.</i> Lumbering. Forest Mensuration. Forestry Seminar. Dendrology. Forest Surveying. Lumbering Trip. (Winter vacation.)	Second year	<i>First Term.</i> Silviculture. <i>Second Term.</i> Silviculture. Dendrology. Forest History and Policy. Forest Economics.
Third year	<i>Second Term.</i> Forest Utilization. Forest Mensuration. Wood Technology. Camp Technique. Timber Testing. Forestry Seminar. Forest Surveying. Range Forage Plants.	Fourth year	<i>First Term.</i> Forest Management. Forest Protection. Forest Administration. Forestry Seminar. <i>Second Term.</i> Forest Management. Mycology and Forest Pathology. Forestry Seminar. Thesis.

In the second year two courses in silviculture are required. During the first term the fundamentals of silviculture are taken up in the class room; the silvies of the more important trees of the vicinity are studied in the field and the silvicultural systems of handling woodlands are considered in detail with special reference to their adaptability to American conditions. In the second semester the work deals largely with seed collecting and forest nursery practice. The department is maintaining a nursery where the students are required to acquaint themselves with all operations from the testing of seeds to the final planting of nursery stock. The two terms of dendrology extend through the last half of the second year and the first half of the third year. The work consists largely in field study, but is supplemented with laboratory work and lectures. The campus and forest garden are well supplied with a large number of tree species both native and exotic, which afford the students an excellent chance for first-hand study. The course in Forest History and Policy is designed primarily to give the student a brief survey of forestry as it developed in the more important countries from the earliest times. The relation of forestry to the other industries; its bearing on agriculture, manufacturing and commerce, is considered in the course in Forest Economics. In



FOREST SCHOOLS OF THE
UNITED STATES-V.

AGRICULTURAL BUILDING AT THE IOWA STATE
COLLEGE, CONTAINING FORESTRY DEPARTMENT



FORESTRY CLASS AT IOWA STATE COLLEGE MEASURING
A PERMANENT SAMPLE PLOT IN A PLANTATION OF
EUROPEAN LARCH



FORESTRY TRACT OF IOWA STATE COLLEGE.
SCATTERED GROWTH OF NATIVE HARDWOODS
UNDERPLANTED WITH WHITE PINE

addition this subject embraces the topics of state ownership, forest taxation and forest education.

The third or junior year of the course is mainly technical. The first term of lumbering takes up the methods of logging and milling in practice in various parts of the country. Careful attention is given to typical operations. This course is prerequisite to the lumbering trip taken during three weeks of the winter vacation during which the students, with an instructor in charge, make a detailed study of logging and milling in either the Lake States or the South. The students are given an opportunity to observe operations both in the woods and mill and a detailed report of the trip is required before credit is allowed. Forest Mensuration extends throughout the third year. Both courses require one afternoon's field work per week, in addition to class-room lectures. The student becomes familiar with measuring instruments, determines the contents of individual trees by different methods, and collects data for volume and growth tables. The college forestry tract and adjacent woodlands, makes possible some practical work in timber estimating on a limited scale. Forest Surveying extends through the entire school year. The work includes pacing, chaining, ranging; the use of the pocket compass, the surveyor's compass, the hand level, the aneroid barometer, the engineer's level and transit and the plane table.

Special attention is given to approximate instruments such as the pocket compass and the aneroid barometer. Careful attention is also given the taking of topography and the making of topographic maps by various methods ranging from approximate surveys to the more detailed stadia-transit and plane table surveys.

The ever-increasing closer utilization of products of the forest is emphasizing the importance of not neglecting this side of forestry. A lecture and reference course in Forest Utilization takes up in considerable detail the minor industries depending upon the forest, such as the production of naval stores, paper pulp, tannin, maple sugar, and the products of destructive distillation of wood. In connection with this course is considered the various methods of preserving ties, posts and poles with special emphasis on the commercial treating plants. A lecture and laboratory course in Wood Technology familiarizes the student with the more important woods both through careful microscopic examination and by less intensive observations of gross appearance. The department is fortunate in possessing several large collections of hand specimens comprising practically all species of wood found in the United States as well as about 800 specimens from the Philippine Islands, Nicaragua and Argentine Republic. In addition about 100 short log specimens, with bark intact, comprising all the important species, are available for the use of the students in the laboratory. The course in Timber Testing is given in the engineering laboratory where the students are given opportunity of making the various mechanical tests of compression, crossbending, shearing, torsion, etc., with some of the more important commercial timbers.

On many of the western forests the grazing problems are occupying a considerable portion of the forester's time. Under present economic conditions grazing will continue to be closely linked to forestry work, and it is highly desirable that technical foresters be prepared to handle the problems of the range. A course in Range Forage Plants and Ecology is designed to give prospective foresters a working knowledge of the more important grasses, forage and poisonous plants of the open forest as applied to the range. A short field course in Camp Technique gives the students instruction and practice in making camps, packing horses for the trail, handling camp fires, etc.

The work in the senior year is lighter in technical subjects and the student

has an opportunity to elect several hours' work. Forest management is continued throughout the year. During the first semester the subjects of working plans and forest regulation consume the major portion of the time. The second terms' work comprises forest finance, theoretical and applied. Special attention is given to financial adjustments for damages to forest property especially those caused by fire. The course in Forest Administration gives the student instruction in the administrative side of national forest work. The work of protecting forest property is one of the most vital questions confronting the foresters today. The subjects of forest fires, the construction of fire lines, and equipment for fighting fires, are taken up in lecture and reference work in the course in Forest Protection. The subject also embraces a study of the destructive forest insects and means of their control. The work in Mycology and Forest Pathology considers, both in the class room and laboratory, a study of the more important diseases of forest trees.

In addition to the technical training in forestry subjects, the Forestry Course gives the students a good foundation work in allied branches, including the following: Two courses in General Chemistry, Organic Chemistry, Morphology, Vegetable Physiology, Systematic Phanerogams, Plant Embryogeny, Plant Breeding, Pomology, Landscape Gardening, Plant Propagation, Soil Physics, Soil Fertility, Soil Surveying and Mapping, General Entomology, Economic Entomology, General Geology, Physics, and three courses in Engineering. Other subjects included in the course are Mathematics, Veterinary, two courses in Horticulture, two in Farm Crops, two in Animal Husbandry, Bacteriology, Dairying, three courses in English, Economics, History of Political Parties, Journalism and Public Speaking.

During the senior year, candidates for the degree of Bachelor of Science in Forestry must present a thesis. This must represent some original line of investigation which has been approved by the department.

The terms of instruction are so arranged as to permit the students in forestry to spend the three summer months in practical work. In securing temporary employment on national forests or with lumber concerns the students are able to get experience which will prove a valuable asset for future work and subsequent instruction and at the same time allow them to receive as wages sufficient money for defraying the necessary expenses incident to the trip. At the conclusion of the four years' course the students have from six months to one year's practical work behind them. It is the desire of the department to make good in the forestry work the motto of the school, "Science With Practice."



EDITORIAL

THE PRESIDENCY OF THE AMERICAN FORESTRY ASSOCIATION

THE appointment as ambassador to Russia of the Hon. Curtis Guild deprived the American Forestry Association of a president of distinguished public service, who brought to this office enthusiasm and a strong belief in the cause which had developed by official contact during six years of service as lieutenant governor and governor of Massachusetts while that state was shaping a constructive forest policy. The directors of the association found a satisfactory solution of the problem presented by his retirement when they elected Robert Perkins Bass, governor of New Hampshire, to the association's presidency. Governor Bass is no tyro in the field of forestry, for he has worked at its problems on his own property, and he made an admirable record for public service as a member and as president of the New Hampshire Forestry Commission.

Governor Bass has another year to serve as governor of New Hampshire, and as there are many and grave questions of state to be worked out and his first duty is to the state, he can hardly be expected to engage in any very active service for the association during that period, but there can be no doubt that his judgment and his personality will be an active force behind the policies of the governing board from this time as long as he holds the office.

A FOREST SCHOOL FOR LANDOWNERS

THE forest administration of Vermont is showing many examples of practical ideas in state work. One of the most recent is the school of ten days' duration, held at the Downer state forest in August. The state forest service saw that there was provision at numerous institutions for the education of foresters of all grades, but that there was a real need of an opportunity for the landowner, the non-professional, to acquire some of the underlying principles of practical forestry in the limited time which can be spared by busy men.

How little these principles are understood by most woodland owners we all know, and this ignorance is one of the reasons for slow progress in forestry. In our eastern states much depends upon the attitude of the farmers and other small landowners, their intelligent application of the fundamentals of forestry on their own holdings, and their view as citizens of forestry as a question of public economics.

The making of a professional forester is a long educational process, like that of preparing a man for any highly specialized calling; but there are broad principles which every citizen should know, and simple facts important to every owner of woodland, which can be taught by competent teachers in a short period of concentrated work, with the illustrative material at hand. It is this, as we understand it, that the Vermont summer school aims to accomplish. It strengthens its appeal to those whom it wishes to reach by including in its instruction the tree problems of the horticulturist.

This is a good move for the general advancement of forestry ideas. To make them of full service such schools should be largely attended by the

classes for whom they are intended, and on that side it may be said that any owner of woodland would find it well worth while, as a purely business matter, to give the time necessary to attend such a course of instruction. If he has not made himself acquainted with the principles of forestry he can learn much that would have for him a direct money value. If his knowledge has been gained only from reading, personal instruction in the forest land will vitalize that knowledge and make it effective.

It is to be hoped that the Vermont enterprise may be a success and that other state forest services or colleges equipped for instruction in forestry may adopt this excellent idea.

EDUCATION IN FORESTRY

IT IS but a few years since the American who took a serious interest in the science and art of forestry had to study it abroad and on his return to his own country he would find general inability to appreciate, much less to apply to American conditions, the knowledge he had gathered from experienced European foresters. But during those years forestry in America has taken amazing strides in popular appreciation and in practical scientific application. The field of forestry operations in this country is wide and constantly widening, and there has arisen a consequent demand for trained men to cultivate it. A new profession has come into recognition and our educational system has awakened to a new demand upon it.

There are now on file in the office of AMERICAN FORESTRY the announcements of more than twenty different colleges and universities giving complete graduate or undergraduate courses leading to professional degrees in forestry, and numerous others giving some instruction in the general principles of forestry or in certain branches of it. In addition to this the principles of forestry are taught in an elementary way in several secondary schools, and one state has a school to fit rangers for its own forest work.

This indicates a great advance in forestry education and an insistent demand for it. The young man who desires to enter forestry work can find ample opportunity to prepare himself. His choice of an institution will depend upon the educational attainments which he can offer as a basis for professional study, the nature and grade of the work he desires to take up, and convenience of locality.

It is not safe to assume equal quality for all institutions that offer similar courses. Forestry education has not yet been satisfactorily standardized and there is a strong temptation for institutions to go beyond their depth, in order to meet a popular demand, and to offer a full program without sufficient faculty or equipment. A letter recently received by the editor from the head of the forestry department in a university of good standing stated frankly that he did not put any stress upon the professional training given by his department, because he did not regard it as strong enough to fit men for the higher grades of professional work. For that they must go to schools with larger faculties and fuller equipment. This may well apply to other institutions and should be borne in mind by the young man seeking a school in which to study forestry.

In order that the opportunities for such study may be better known, this magazine began in August and continues this month the publication of a series of articles describing the various schools and their work. We believe that these articles will answer many questions that are asked with increasing frequency.

One other observation is pertinent in this connection. In forestry as in other new professions, the first demand is met with an inadequate supply and it is comparatively easy for the first comers to find places. The multiplication of schools and the popularity of the work for young men who love the out of doors is, however, making competition greater, and the time has already come when government or private employers will demand a high standard in the men they take on. The profession is not yet crowded, but it has already reached the point where men must seek places on the basis of thorough knowledge and real ability. To say that one is a forester is not enough. His credentials will be closely examined and he cannot prepare himself too well.

THE THIRD NATIONAL CONSERVATION CONGRESS

THE third National Conservation Congress will meet this year in Kansas City, September 25, 26 and 27. It will be made up as heretofore of delegates from cities, states, and organizations, met for the consideration of topics related to the conservation of the forests, lands, waters, minerals and the vital resources of the nation. The function of this congress, if administered in a broad and liberal spirit, is an important one, deserving thoughtful consideration. The criticism was made of the last congress that too much of its time was given to politics and too little to practical conservation. We trust that this criticism will not be made of the third congress. The able and forceful president of the congress, Henry Wallace, says that there will be no politics in it, and he is a leader whose personal influence will be very real and effective.

The thing that the country wants and expects from such a gathering is helpful guidance along the road to the better and more economical utilization of the natural wealth of the country. There is no real reason why those who still hold to the law of the pioneer should be allowed to occupy the time of a congress met for considering the most serious material problems of a country whose frontier has been pushed into the ocean, and whose resources have been found to have a limit. We want to hear from the foresters, the engineers, the workers in all the fields to which the conservation idea applies. Let them tell us what can be and is being done and how to do it; and let constitutionalists who study the Constitution as a bulwark and protection for the people of the United States, and not for any interest or section, show us the legal and constitutional way.

AMERICAN FORESTRY suggested last year that too many of these great national gatherings have been mere talkfests and that in the future to be effective they must be organized for definite and tangible results, as was the first and most successful of them, the American Forest Congress of 1905. This view we still hold and with greater earnestness as each year our conservation problems become more pressing, concrete and definite. We have confidence that the able men who are directing the third conservation congress take this view and will guide it in the right direction.

NEW HAMPSHIRE'S ANNUAL FORESTRY COUNCIL

THE annual meeting of the Society for the Protection of New Hampshire forests on the second and third of August was, as it has been for some years past, significant of the progress of forestry in New Hampshire and of the spirit of harmony and co-operation which has been a chief element in

bringing about that progress and which the society has been so largely instrumental in securing. The meeting this year was held for the third time at Bretton Woods.

Tuesday afternoon, August 1, there was an excursion from the Crawford House to the summit of Mt. Willard to obtain the incomparable view which Willard affords of the Crawford Notch, which will soon become the property of the state of New Hampshire, a noble scenic and forest reservation of 13,000 acres. Wednesday morning there was an excursion up Mt. Webster into a fine body of primeval spruce on the side of the Notch. A little later a meeting was held of the New Hampshire Timberland Owners' Association, an organization on the lines of the great western protective associations, which is doing valuable co-operative work in fire protection and acts in harmony with the state forestry commission. In the afternoon at the Crawford House there was a meeting of town fire wardens and the district chiefs of the state forestry commission to discuss the practical problems of the state, especially in the field of fire control.

In the evening and on Thursday the meetings were held at the Mt. Pleasant House. The Wednesday evening meeting was addressed by Governor Robert P. Bass, by Hon. W. C. Hawley, a member of the National Forest Reservation Commission, by Henry S. Graves, forester of the United States; by Thomas Nelson Page, acting president of the American Forestry Association, and by W. R. Brown, president of the New Hampshire State Forestry Commission.

The address of Mr. Hawley was of particular interest because he opposed as a member of the House of Representatives and of the Committee on Agriculture the passage of the Weeks bill, and his hearty and evidently sincere expression of belief in the value and success of the law were fully appreciated by his audience. Mr. Hawley predicted the passage of the joint resolution restoring to the purchase fund the \$3,000,000 which has lapsed by expiration of the time limit; and further expressed the belief that the principle of the law would be made a permanent policy of the government at the expiration of the five years of life of the present law.

Thursday morning at the business session the usual routine business of an annual meeting was transacted. The reports showed that the society was in excellent working condition. It has obtained through purchase by popular subscription a tract of 654 acres on Sunapee Mountain, which it is believed will make one of the most attractive mountain forest parks in New England. This was accomplished through the efforts of Herbert Welch, of Philadelphia, a summer resident of the Sunapee country, who gave a spirited talk at this session on the new reservation. George B. Leighton, of the forestry commission, in an able paper proposed a plan for an extensive state forest in the region south of Lake Sunapee. The present officers of the society were re-elected.

J. H. Emerton spoke on "Woodland Spiders," illustrating with numerous specimens from his fine collection; and D. M. Rogers, who has charge of the gypsy and brown-tail moth work in New England of the United States Department of Agriculture, discussed the invasion of New Hampshire by these pests.

In the evening was held a most interesting meeting devoted to New England's state forest problems, with addresses, illustrated with the stereopticon, by A. F. Hawes, state forester of Vermont; E. C. Hirst, state forester of New Hampshire, and P. W. Ayres, forester of the Society for the Protection of New Hampshire Forests.

INSTITUTIONS GIVING INSTRUCTION IN FORESTRY

List by U. S. Forest Service

POST GRADUATE

Yale University, Forest School, New Haven, Conn.:

Two-year post graduate course, degree of Master of Forestry. Two months' summer course at Milford, Pike Co., Pa.

University of Michigan, Forest School, Ann Arbor, Mich.:

Two-year post graduate course; degree of M. S. in Forestry. A six weeks' summer school, at Roscommon.

Harvard University, Forest School, Cambridge, Mass.:

Two-year graduate course.

UNDERGRADUATE

Idyllwild School of Forestry, Riverside Co., Cal.:

Summer school of two months.

Stanford University, Cal.:

A course of lectures in forestry is given annually.

Colorado School of Forestry, Colo. Springs, Colo.:

Four-year course, leading to the degree of *Forest Engineer*. A summer course at Manitou Park, July 15–Sept 15.

University of Chicago, Chicago, Ill.:

A course in forest ecology.

Winona College of Agriculture, Winona Lake, Ind.:

Farm forestry in fall term of senior year.

Berea College, Berea, Ky.:

Fall term, second year, of two-year farmers' academy course.

Harvard University, Forest School, Cambridge, Mass.:

Four-year course in forestry in Lawrence Scientific School; degree of *B. S. in Forestry*.

Eric Forest School, Duxbury, Mass.:

College preparatory course in forestry.

Mount Hermon Boys' School, Mount Hermon, Mass.:

Landscape gardening and forestry, one term.

Berkshire Forest School, Mount Washington, Mass.:

Three-year course.

Smith's Agricultural School and Northampton School of Technology, Northampton, Mass.:

Third year of the four-year agricultural course.

Crookston School of Agriculture, Crookston, Minn.:

Forestry in the third year of the three-year course.

University of Montana, Missoula, Mont.:

The work in forestry includes courses in botany and forestry leading to a degree, and short courses in forestry in January, February, and March.

Cornell University, Ithaca, N. Y.:

Course in forestry established in New York State College of Agriculture, Prof. Walter Mulford, Director.

Hobart College, Geneva, N. Y.:

A course in elementary forestry.

University of Syracuse, Syracuse, N. Y.:

Technical forestry in Junior and Senior years. Professional forester's degree after one year spent in graduate study and field work.

Biltmore Forest School, Biltmore, N. C.:

Course covers one full year, leading to the degree of *Bachelor of Forestry*, and, with two years of practical forest work, the degree of *Forest Engineer*.

(Now a traveling school having working fields during twelve months of each year—in Germany (winter), North Carolina (spring), Tennessee (summer), and Wisconsin (fall).)

*State Forest School, Bottineau, N. Dak.:**Antioch College, Yellow Springs, Ohio:*

Summer School of forestry.

Murray State School of Agriculture, Tishomingo, Okla.:

Three hours a week, fall term, third year of three-year agricultural course.

Pennsylvania State Forest Academy, Mont Alto, Pa.:

Maintained by the Pennsylvania Department of Forestry for the training of young men of the state for work on the state forest reserves. Three-year course. Practical work in the summer months on the Mont Alto Reservation and class work during the winter months.

Middlebury College, Middlebury, Vt.:

The new catalogue of this college shows that students may now have two years of continuous advanced work in forestry.

University of Washington, School of Forestry, Seattle, Wash.:

Four-year course in forestry, leading to degree of *B. S. in Forestry*. Three months' winter course for forest rangers.

Marathon County School of Agriculture and Domestic Economy, Wausau, Wis.:

Double periods of five hours each in third term of first year and in first term of second year.

IN LAND-GRANT COLLEGES

Alabama Polytechnic Institute, Auburn, Ala.:

Senior class of agricultural course—forestry three hours a week and forest laboratory work two hours a week.

Agricultural and Mechanical College for Negroes, Normal, Ala.:

Forestry is taught in the senior year of the four-year agricultural course.

University of Arkansas, Fayetteville, Ark.:

Course of elementary lectures.

University of California, Berkeley, Cal.:

Course of ten lectures by members of the Forest Service during the summer session of the University.

State Agricultural College, Fort Collins, Colo.:

Four-year course in forestry, leading to the degree of *B. S.*

Connecticut Agricultural College, Storrs, Conn.:

In fourth year, in last half of fall term.

Delaware College, Newark, Del.:

In second term of the junior year of the four-year agricultural degree course, and in the second year of the two-year agricultural course.

Georgia State College of Agriculture, University of Georgia, Athens, Ga.:

Four-year course in forestry, leading to degree of *B. S. in Forest Engineering*.

University of Idaho, Moscow, Idaho.:

Four-year collegiate course in forestry.

University of Illinois, Ill.:

Forestry given as electives in undergraduate work in horticulture.

Purdue University, Lafayette, Ind.:

Course in forestry, offered during the last three years of the course in general science.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.:

Course in horticulture and forestry, four-year, leading to degree of *B. S. A.*

Work in horticulture and forestry is also offered in the short winter course. Post graduate course.

Kansas State Agricultural College, Manhattan, Kansas:

Four-year course in horticulture and forestry, leading to degree of *B. S.*
Post graduate work.

University of Maine, Orono, Me.:

Four-year course in forestry, leading to degree of *B. S.*, in the College of Agriculture. Post graduate work in forestry, leading to the degree of *M. S.* Correspondence course in forestry.

Maryland Agricultural College, College Park, Md.:

Five lectures in general forestry in the weekly lecture course in agriculture. Farm forestry is taught in the second year of the two-year agricultural course.

Massachusetts Agricultural College, Amherst, Mass.:

The State Forester gives annually a course of lectures on the general principles of forestry.

Michigan Agricultural College, East Lansing, Mich.:

Four-year course in forestry, leading to the degree of *B. S.* Also a five-year course open to graduates of the eighth grade. Graduate work, with *M. S.* degree.

College of Agriculture of the University of Minnesota, St. Anthony Park, Minn.:

Four-year course in forestry leading to the degree of *B. S.* A four weeks' winter short course, including forestry, is also offered. Graduate work.

Mississippi Agricultural and Mechanical College, Agricultural College, Miss.:

Two years of farm forestry and silviculture.

College of Agriculture, University of Missouri, Columbia, Missouri:

As one of the electives in the undergraduate work in horticulture.

Montana Agricultural College, Bozeman, Mont.:

Four-year course in horticulture and forestry, leading to degrees of *B. S.* in *Horticulture* and *B. S. in Forestry*. Forestry also included in the three-year horticultural course in the School of Agriculture.

University of Nebraska, College of Agriculture, Lincoln, Nebraska:

Four-year technical group in forestry leading to *B. S.* degree. General forestry is required in the first semester, third year, and is elective in the fourth year of the general agricultural group; also elective in the four-year technical agricultural group. Instruction in forestry is also included in the one-year teachers' course in agriculture for high and normal school teachers.

University of Nevada, Reno, Nev.:

Elective in the four-year agricultural course.

New Hampshire College of Agriculture and Mechanic Arts, Durham, N. H.:

In junior and senior years of full course in agriculture, and in both years of two-year course.

North Carolina Agricultural and Mechanical College, West Raleigh, N. C.:

Senior elective, first term, agricultural course.

State Agricultural and Mechanical College for the Colored Race, Greensboro, N. C.:

Winter term of the senior year of the four-year agricultural course, leading to the B. S. degree.

North Dakota Agricultural College, Agricultural College, North Dakota:

Six-weeks course in forestry in the junior year, third term, of the four-year agricultural course.

College of Agriculture and Domestic Science of the Ohio State University, Columbus, Ohio:

Four-year course in forestry, leading to B. S. degree. Forestry is also offered in the first term of the second year of the two-year course in horticulture.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.:

Winter term of the senior year of the general science, agricultural, and science and literature courses.

Oregon State Agricultural College, Corvallis, Ore.

Four-year course in forestry leading to B. S. degree. Two-year elementary course in forestry. Six weeks' winter course for forest rangers.

Pennsylvania State College, State College, Pa.:

Four-year course in forestry, leading to B. S. degree. Forestry also an elective subject in the second year of the two-year agricultural course.

Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I.:

Forestry required in the second term, junior year, agricultural course.

Clemson Agriculture College of South Carolina, Clemson College, S. C.:

Forestry required in the junior year of the four-year agricultural course, and in the second year of the two-year agricultural course.

South Dakota Agricultural College, Brookings, S. Dak.:

Forestry is required subject in the second semester of the senior year of the animal husbandry group, four-year agriculture course; and in the third year of the three-year school of agriculture. The three-months winter course in horticulture includes the study of forest trees.

University of Tennessee, Knoxville, Tenn.:

Forestry is one of the subjects in the senior year of the four-year agricultural course.

Agricultural and Mechanical College of Texas, College Station, Texas:

Elementary forestry is one of the undergraduate subjects in the senior year of the horticultural group of the four-year agricultural course.

Agricultural College of Utah, Logan, Utah:

The U. S. Forest Service and the Utah College offer conjointly a three-months winter course for forest rangers.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Blacksburg, Va.:

In the third year of the four-year horticultural course.

Hampton Normal and Agricultural Institute, Hampton, Va.:

In second year of the three-year agricultural certificate course.

State College of Washington, Pullman, Wash.:

In second semester of sophomore year of horticultural group of four-year agricultural course. There is also a school of forestry with a two-year course.

West Virginia University, Morgantown, W. Va.:

One of the undergraduate subjects in the College of Agriculture.

University of Wisconsin, Madison, Wis.:

One of the undergraduate subjects in the botanical group in the College of Letters and Science.

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- Schweizerische zeitschrift für forstwesen, June, 1911.—Aus der praxis zur ermittelung des waldbodenwertes, by T. Felber, p. 165-73.

EDUCATIONAL WORK

Course in Agricultural Education

The State Board of Education has authorized a new course at the Iowa State College—a course in Agricultural Education. Its purpose is to train teachers for agricultural and domestic science work in secondary schools. There is a wide and rapidly increasing sentiment in favor of industrial training in the public schools. The demand is far in excess of the supply of teachers. Public school work has not heretofore appealed to the graduates of the agricultural colleges. Recently the demand has become so great that the schools are paying from \$1,000 to \$1,500 for graduates, with assurance of a rapid advance as merited. Other states are paying much larger salaries than Iowa. Out of 855 students enrolled in the Division of Agriculture at Ames during the past year, comparatively few are looking forward to a teaching profession. Of the 78 students graduating from the Division of Agriculture this year not over 10 per cent will become teachers. The establishment of this course is in recognition of the demand upon agricultural colleges for teachers specially trained for the secondary schools. It is recognized that the progress of this work will be measured by the qualifications of the teachers having it in charge. It will probably be many years before the supply of such teachers is equal to the demand.

Prof. A. V. Storm, who has been elected to head the new department, has had an extensive experience in public school work, and his service in the extension department of the college during the past four years has supplemented his school experience in a way that will strengthen him for this work.

University of Nebraska

At a recent meeting of the Board of Regents of the University of Nebraska two changes were made in the faculty of the Forestry Department. The vacancy made by the death of Professor Frank J. Phillips was filled by the promotion of O. L. Sponsler from Adjunct Professor, and W. J. Duppert was appointed Adjunct Professor. Mr. Duppert received both his Bachelor's and his Master's degrees in Forestry from the University of Michigan. His experience

along forestry lines extends over several years in New York, Ohio, and as Forest Assistant on the Coconino National Forest, Arizona.

Chair of Forestry

University of Missouri Will Put in Regular Course in Forestry Under Prof. Ferguson

St. Louis., Mo., July 3.—For the first time in the history of the University of Missouri, at Columbia, Mo., there will be given, this fall, regular courses in forestry, the position of professor of forestry having now been created in connection with the College of Agriculture.

The new department of the university's work will be in charge of Prof. J. A. Ferguson, of State College, Pennsylvania, who has been appointed professor of forestry at the university. Prof. Ferguson is a graduate of the Yale Forestry School and has for nearly two years been the head of the department of forestry at the State College of Pennsylvania. He will begin his work at Missouri University in September.

Fifty thousand acres of forest lands in the southern part of Missouri are owned by the College of Agriculture of the State University, and it is planned to utilize these lands for the instruction of the students in practical forestry.

List of Schools

In the December number of *AMERICAN FORESTRY* we published, for the information of those interested, a list of universities, colleges and institutions where forestry may be studied, giving a statement of the nature and scope of the work done in each case. Necessarily these were very brief, and since then we have been arranging a series of articles dealing more fully with the details of the courses in the various institutions. The first of these articles appeared in the August number. In this issue—the educational number—we are publishing four more of them, and hope to continue with one or more in each successive number.

Fifteen New Men for Missouri College Staff

With an increase of 227 per cent in the total enrollment of students at the Missouri College of Agriculture, it has been found

necessary to enlarge the teaching force of the institution. Fifteen new men have been added to the college and experiment station staff during the summer. This means that every department in the college will have at least one more member than it has had heretofore. The new men appointed are:

J. A. Ferguson, Professor of Forestry, beginning September 1, 1911.

A. J. Meyer, Assistant to the Dean and Superintendent of Short Courses in Agriculture, beginning July 1, 1911.

H. L. Kempster, Assistant Professor of Poultry Husbandry, beginning September 1, 1911.

P. L. Gainey, Instructor in Botany, beginning September 1, 1911.

W. E. J. Edwards, Assistant in Animal Husbandry, beginning September 1, 1911.

E. G. Woodward, Assistant in Dairy Husbandry, beginning September 1, 1911.

E. E. Vanatta, Assistant in Agricultural Chemistry beginning July 1, 1911.

H. G. Lewis, Assistant in Soil Survey, beginning June 1, 1911.

C. A. LeClair, Assistant in Agronomy, beginning September 1, 1911.

W. W. Wobus, Assistant in Dairy Husbandry, beginning July 1, 1911.

Walter E. Camp, Research Assistant in Veterinary Science, beginning June 1, 1911.

J. E. Dunn, Assistant in Soil Survey, beginning June 1, 1911.

E. C. Hall, Assistant in Soil Survey, beginning June 1, 1911.

D. M. Nelson, Assistant in Agricultural Chemistry, beginning August 1, 1911.

P. M. Brandt, Assistant in Dairy Husbandry, beginning September 1, 1911.

The New York State College of Agriculture at Cornell University

Announcement Regarding the Work in Forestry for the Year 1911-1912

The following lines of work will be conducted by the forestry department during the year 1911-1912:

(1) Help for the farmers and other forest owners of the state in the care of their woodlands. This will include instruction in farm forestry and in general silviculture at the university; extension work to reach the people of the state; and field studies of woodlot conditions and needs.

(2) Experimental work relating to the woodlot and general forest problems of the state.

The courses in forestry to be given the present year (silviculture, farm forestry) are not planned for students intending to make forestry a profession, and do not lead to a forestry degree.

The faculty of the department consists of a professor and an assistant professor.

Details regarding the courses in forestry may be obtained from the announcement of the New York State College of Agriculture.

Ithaca, New York, August 14, 1911.



FIG. III.—DIAGRAM OF RAILROAD FIRE LINE CONSTRUCTED ON LEVEL GROUND ACCORDING TO CHAPTER 74, LAWS OF 1909.

NATIONAL FOREST WORK

Aeroplanes to Protect Forests

Maj. Frank A. Fenn, supervisor of the Selway forest, embracing 1,600,000 acres formerly part of the Nez Perce reserve in north central Idaho, predicts that the time is not far distant when aeroplanes and wireless telegraphy will be important factors in protecting timbered land in the Pacific slope country. He thinks a man in a flying machine could do more accurate and extensive survey work in the mountains in a few hours than is usually accomplished by a force of twenty rangers in a week when forest fires are raging, and with wireless stations installed on peaks in the chief danger points it would be a comparatively easy task to assemble men and apparatus to check and extinguish the flames and prevent spreading. Major Fenn, who is stationed at Kooskia, has completed preparation to handle fire outbreaks and has forty men patrolling the reserve, in addition to which are twenty men stringing telephone lines and building trails and wagon roads. Charles Fisher, with headquarters at Orofino, has charge of the Clearwater reserve, also formerly part of the Nez Perce forest. One hundred and twenty miles of telephone lines are in operation through the mountains from Kooskia to Powell station on the Licksaw via the Selway and Graves creek, and it is planned to extend the line this year through the Lolo pass to Lolo Hot Springs, Montana, 60 miles from Powell station.

First Purchase for Appalachian Forest

Nashville lumbermen are first to score in selling land to the government for the establishment of the Appalachian National Forest. Our issue of last week contained a brief notice of the approval by the commission of the purchase of a tract of some 32,000 acres in Fannin, Union, Gilmer and Lumpkin counties, lying along the headwaters of the Toccoa River, an important tributary of the Tennessee.

The tract embraces the entire holding in that neighborhood of Messrs. Andrew and N. H. Gennett, both natives of Nashville, who started in the lumber business here, and later removed to Fort Madison, S. C., where they successfully operated a big band mill for several years. Selling this plant with its important timber holdings to a prominent Baltimore operator, the Messrs. Gennett invested heavily in timberlands in both the Carolinas and in north Georgia.

They have sold some very large tracts recently to be operated by lumbermen.

Having a thorough personal knowledge of the entire Southern Appalachian field, and having made a study of what the Forest Service at Washington is attempting to do in the establishment of a national forest in the Appalachian region, the Messrs. Gennett were in position to go before the commission with a definite and specific offer of a large area admirably located and upon which a thorough cruise of the timber had been made.

It is announced that the trade will be consummated as soon as titles to the property can be approved by the government. The deal involves \$207,821, the government commission having reported the value of the forest products on the tract to be \$152,911.10, and the value of the land \$54,909.75. It appears that the tract is pretty good hardwood timber, cutting something like 3,500 feet to the acre. The following is the government cruise of the timber, in addition to which there are 2,535 cords of hemlock bark and 7,671 cords of chestnut bark:

White Oak.....	16,291,044
Red Oak.....	18,761,996
Chestnut Oak.....	7,585,248
Chestnut	38,213,560
Poplar	7,958,764
Hemlock	3,620,232
White Pine.....	833,228
Locust	632,104
Miscellaneous	4,453,460

Total 98,349,636

In commenting upon the value of this tract, the report of the Forest Service to the commission empowered to buy says:

"The only thing lacking at the present time to render this tract highly desirable from a lumber operator's standpoint is railroad transportation. There has for years been talk of a railroad between Mineral Bluff and Gainesville, Ga., a distance of 52 miles in an air line. This route has already been surveyed running up Rock Creek, in the southern division of the Gennett tract, and crossing the main summit of the Blue Ridge Mountains at High Tower Gap. This road, if constructed, would tap the largest section of Georgia which is now without railroad transportation. All of this tract would be lumbered economically after the construction of such a railroad. On account of the great natural resources of this region, the construction of

a railroad will inevitably come about in the course of time. At the present time the prospects of construction are indefinite. This fact is chiefly responsible for the comparatively low value of these lands."

This raises the question as to what will be the effect generally upon railroad extension in the Southern Appalachian of the establishment of this national forest. In a very few years, beyond a doubt, all the timber in that region as good as the Genett tract would pass into the hands of operating lumbermen, and as an incident to these operations a considerable railroad development would occur. A number of spurs and extensions would be built by lines penetrating that region, and in addition many logging roads would be constructed which ultimately would develop into common carriers. How much this railroad development will be retarded by the passing

of a big area of the timber into the hands of the government remains to be seen. It is not the purpose of the government, as we understand it, where it acquires land having timber good enough for sawmill operations, to withhold the timber from manufacture, but to offer the utmost encouragement to lumbermen to come in and buy and cut it under such regulations as will perpetrate a regrowth, while protecting the area from destructive erosion.

The editor of *The Southern Lumberman* is familiar with much of the tract embraced in the present purchase. It is in a region where, when the timber has been cut off, the erosion is frightful, and is in the heart of a section where, if this erosion can be prevented throughout a wide territory, the effect on a number of important southern streams will be very great.—*The Southern Lumberman*, 1, July, 1911.

NEWS AND NOTES

Uncle Sam Owns Much Timber but Has Only One Saw Mill

Wausau, Wis., June 27.—According to official reports, Uncle Sam owns some six hundred billion feet of standing timber scattered over a wide territory in the United States. However, at only one place has he attempted to convert stumpage into lumber on a commercial scale. This is at Neopit, Wis., where a government-built and operated sawmill is cutting lumber from the timber on the Menominee Indian Reservation, on the theory that more profit can thus be made for the Indians than by selling stumpage for some one else to manufacture. It is an up-to-date, modern plant, with two band and a resaw, besides shingle and lath mills. It was built three years ago under the direction of E. A. Braniff, of the United States Forest Service, and the entire plant represents an investment of more than \$300,000. The mill is turning out 250,000 feet of lumber every twenty-four hours, and it is expected that the annual cut from now on will be 40,000,000 feet. With 2,000,000,000 feet of standing timber on the reservation to draw upon, the plant has a long future before it, regardless of any second crop of timber which may be obtained through scientific management of the cut-over land. It is estimated that approximately 40 per cent of the stand is hemlock and the remainder exceptionally good white pine and hardwoods. The cut this year is chiefly white pine, and some very high class timber is being manufactured, as will be seen by the illustrations. One contract calls for 1,000,000 feet of waney-edged pine to be shipped to England, for which \$50 per thousand is paid at the mill.

In addition to being the only government

sawmill in the United States, this plant has the unique distinction of having a woman for its sales manager—Miss E. S. Gallet—and she is generally acknowledged to be well fitted for the task. Uncle Sam has experienced various kinds of trouble with his sawmill, including some unpleasant notoriety during the Ballinger-Pinchot investigation, but he takes no chances with slow collections, and in this respect is decidedly ahead of the ordinary lumber manufacturer. The lumber at Neopit is advertised and sold to the highest responsible bidder, and it is paid for in cash without discount when loaded on the cars ready for shipment. An exact and complete cost-keeping system installed by the general superintendent and Indian agent, A. S. Nicholson, indicates that the operation is making a small margin of profit above present stumpage prices, after allowing for depreciation, interest on the investment, and overhead charges of every kind.

The Menominee Indians number some 1,100, and on an average about 200 of the men are employed in the woods, on the river, and around the mill. The Indians are exceptionally good river men, but will not have so much opportunity for work of this character as was anticipated. The original plan was to drive all timber to the mill, but this has been abandoned, and the logs will hereafter be brought in by railroad. Seven miles of logging road is now built, and the system will be gradually extended to reach all the timber on the reservation. After cutting, part of the reservation will be cleared and allotted to the Indians for farms, while the remainder will be held for another crop of timber, the cutting on this section now being restricted to timber marked according to forestry methods.

The annual fire loss of America is one of our worst national extravagances. In our towns it is partially insurable and costly protective systems are maintained. In our forests the only insurance is prevention and protection. Adequate provision must be made for both. :: :: :: ::



DOUGLAS FIR IN OREGON

THE ONLY ENEMY OF OREGON'S MAGNIFICENT
FIR FORESTS IS FIRE

American Forestry

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FIRE PROTECTION IN THE NATIONAL FORESTS

By EARLE H. CLAPP.

EDITOR'S NOTE.—*The conditions and methods of fire protective work in the national forests are clearly set forth in Mr. Clapp's article, which will be concluded next month with consideration of the topics of equipment, organization, patrol, and fighting fires.*

PROTECTION from fire is absolutely necessary to the successful practice of forestry. On the national forests protection is exceedingly difficult because of the long dry seasons which are almost invariably periods of high winds, and because the national forests are stocked almost entirely with coniferous species and in general are located in the mountainous, most inaccessible, and most sparsely settled parts of the west.

The first important work after the transfer of the national forests from the Department of the Interior to the Department of Agriculture in February, 1905, was the completion of the administrative organization begun in the General Land Office. The number of men available for administration and protection was at first comparatively small and each man had to cover an immense area. Most of the men were comparatively inexperienced; for fire fighting they were poorly equipped. Public sentiment regarding protection from fire was often indifferent, and in many localities even hostile. Gradually, however, the number of men available for administrative purposes has been increased; they have become more thoroughly trained for their duties, and have been better equipped. Public sentiment became more and more favorable. It has been possible gradually without doing away with the feeling of individual responsibility among the men, to give in more detail and to make more directly applicable to local conditions instructions for fire protection which necessarily at the beginning were confined to statements of broad principles.

The basic principles for fire protection which are being adopted are simple and provide that protection shall be given according to the value of the material to be protected either for market purposes or watershed protection, and the degree of risk. The degree of risk depends not only on the number of fires, but the damage which will be done by fire. In addition the following essentials from the standpoint of administration are recognized: First, to prevent fires where this is possible; and second, if prevention is impossible to discover fires promptly, to get to them in the shortest possible time with enough trained men suitably equipped to extinguish them without appreciable

damage and at reasonable cost. In order to protect the forest from fires in accordance with these basic principles, and to attain these administrative essentials, the need for systematic effort and for team work to replace individual and disconnected efforts has become more and more apparent. It is recognized that so far as possible, all needs and emergencies to the full extent that men and money are available, must be foreseen and provided for. In this way the greatest efficiency can be secured at the least cost.

FIRE PLANS.

The feeling is growing that systematic protection can be brought about only by a fire plan for each administrative unit or national forest. Each fire plan is now or will eventually become a part of the forest working plan which covers all phases of administration and management.

Fire plans have already been prepared wholly or in part, and are now in effect on a large number of national forests. In each case these plans are based on a careful study which is still being continued and a local application of the principles and essentials already outlined. In addition to the determination of the comparative value of the forest areas to be protected, such areas are being located and mapped as fast as available funds will allow. Studies are being made of the causes and location of all past fires on each forest. Methods are being devised for the prevention of fires so far as this is possible, and studies made to determine on the ground by the men concerned the manner in which patrol should be conducted in order that fires may be discovered quickly. The best form of co-operation between adjoining districts and between adjoining national forests, both in patrol and in fighting fires, is being investigated. Various schemes are being tried experimentally to establish an exceedingly flexible force of forest patrolmen, and in case of need, fire fighters. Various plans are also being tried for rapid transportation of men with equipment and supplies to fires. Plans for permanent improvements, including the building of headquarters for officers; pastures in order that horses may be obtained quickly and easily; telephones and signal systems for prompt communication; roads and trails for easy transportation; lookout stations on prominent peaks which overlook large areas of forest land; tool boxes for the storing of tools at strategic points, have been largely completed and take into account the necessity, so far as the needs can be foreseen, for intensive fire protection. The plans which are based on such investigations and experiments must first of all provide for protection from fire, but must also co-ordinate protection work with the administration work which is to be carried on during the fire season. Experience has shown that each plan must be adapted to the conditions on the ground; that it must be exceedingly flexible to suit changed conditions and to cover all possible emergencies. In order to be successful, it must establish definitely in as much detail as possible the responsibility of all the men concerned without making them feel that the initiative in many phases of the work is being taken from them. The most successful plans will obviously be those which are most complete, most simple and most usable. Finally, provision must be made for constant improvement in prevention and actual fire fighting in accordance with experience and the results of investigations.

Maps usually form a part of the plan and show the location of timber, all permanent improvements which may be of value in fire protection, all particularly dangerous zones, tool caches, ranches where supplies or men may be obtained, roads, trails, telephone lines, etc., topography and any other features which can be placed upon a map and which will be of value in fire protection.

While the following discussion includes questions which must be considered in the preparation of fire plans, it will be obvious that many of the points mentioned can not be included.

VALUE OF MATERIAL AND RISK.

The practice in the Forest Service has not become very definite in regard to the effect which the value of the material and the fire risk should have in protection. In a district embracing in part Montana and northern Idaho an attempt has been made to place the protection in the western part of the district as compared with the eastern in the ratio of 3 to 1, because of the dense stand of western white pine in the west as compared with the lighter open stand of western yellow pine in the east. On individual forests in general, heavy stands of timber and those stands of timber which are in the greatest danger from fire, receive much more protection and are considered first in the location and building of permanent improvements, necessary for efficient fire protection.

CAUSES AND PREVENTION.

The following table shows the number of fires which have occurred on the national forests from 1906 to 1910 inclusive, and also the causes:

Number of Fires in 1906, 1907, 1908, 1909 and 1910, and Reported Causes; Also Percentage of Causes to Total Number of Fires

Causes	1906		1907		1908		1909		1910		Total for the years 1906 to 1910 inclusive	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Locomotives	303	26.7	273	20.1	603	22.1	1,186	37.8	1,704	32.8	4,069	30.0
Lightning	261	23.0	176	13.0	555	20.3	294	9.4	724	14.0	2,010	14.8
Incendiary	24	2.1	19	1.4	102	3.7	97	3.1	302	5.8	544	4.0
Brush Burning	15	1.3	34	2.5	68	2.5	181	5.8	307	5.8	605	4.5
Campers	312	27.5	361	26.7	493	18.1	431	13.7	688	13.2	2,285	16.9
Sawmills and donkey engines	---	---	65	4.8	5	.2	38	1.2	51	1.0	159	1.2
Unknown	196	17.3	367	27.1	263	9.7	758	24.1	1,184	22.8	2,768	20.4
Miscellaneous	22	2.1	60	4.4	639	23.4	153	4.9	241	4.6	1,115	8.2
Total	1,133		1,355		2,728		3,138		5,201		13,555	

The area in national forests has increased from approximately 107,000,000 acres in 1906 to a little more than 190,600,000 acres at the present time. During these five years a regular field force, which has increased from approximately 1,000 in 1906 to approximately 2,500 in 1910, and which has been augmented by other labor when necessary, has extinguished a grand total of 13,533 fires.

With the exception of those started by lightning, which approximate about 15 per cent of the total, all these fires are preventable. In many parts of the west electrical storms during certain parts of the year which are accompanied by little or no rain are very dangerous. For instance, one storm on the Rainier Forest on July 14, 1911, started no less than twenty fires. Fortunately, however, many of these fires went out and the others, with one exception, were reached and put out by rangers before they attained serious proportions. It has been found that in some forests the danger of fire from electric storms is confined to more or less definite zones, and the recognition of this fact is of great value in protection. For instance, on the Payette Forest in Idaho there is great danger from fires started by lightning on only three peaks.

Of the preventable fires the railroads are responsible for by far the largest percentage. Although the mileage of railroad within the national forests is comparatively small, during a period of five years 4,069 fires, or 30 per cent of the total number on the national forests have been set by locomotives. Railroad companies building new lines are in general required to clear and keep clear from all inflammable material their rights of way and an additional strip of sufficient width to prevent the setting of fires under ordinary conditions; to notify forest officers in case fires are set; to furnish section hands for assistance in fighting fires along the right of way or for which the company is responsible; to use oil for fuel or equip locomotives with suitable spark arresters. A number of railroad companies whose lines were constructed before the forests were created, are co-operating with the Forest Service along much the same lines, and efforts are being made to secure co-operative agreements with others.

It is estimated that more than 400,000 people visit the national forests for recreation each year, and carelessness on the part of a small percentage has been responsible for 2,285 fires in five years, or nearly 17 per cent of the total.

The most effective method of checking these people and those who are responsible for the brush burning, incendiary, and other preventable fires, is by education.

EDUCATION.

The educational work of the Forest Service in regard to fires has included chiefly attempts to show the extent of the damage caused, to encourage prevention of fires where possible, and to encourage efforts to extinguish fires which start. Local forest officers embrace every opportunity, especially just before and during the fire season, to confer with forest users and residents in the forest and secure their interest and co-operation in fire protection. In addition patrolmen during the entire season try to see all campers, hunters and other transients who may be on the forests, inform them tactfully of the best methods for handling and the care necessary with camp fires, and if necessary inform them of the federal and state laws for fire protection and the penalties for their violation. In addition to personal conferences fire warning notices of various kinds are posted in conspicuous places in the forests, at post offices, stores, and public places. These notices, which are of several forms, call attention to the fire laws, the penalties for violation of the laws, the rewards which are offered for the arrest and conviction of offenders, and give the names and addresses of forest officers who should be notified if fires are discovered, and finally direct transients to good camping sites, which in many cases are kept sufficiently clear of debris and inflammable material, so that the danger from fire is slight.

Many district foresters and forest supervisors have adopted the plan of writing each year to people who should be interested in fire protection, including forest users and residents in or near the forests, asking their co-operation; to ministers, asking them to bring to the attention of their congregations the importance of fire protection from the standpoint of the public welfare; to editors asking for their influence in stimulating public interest, and to the proprietors of summer resorts, asking them to assist in order to preserve the scenic beauty of the forests. Editors or others whose influence is great, and who question the value of fire protection, are sometimes urged to accompany forest officers and to study fire damages on the ground. Public meetings for the discussion of fire protection are valuable and have accomplished much. Important results have been, and are being, secured by civil and criminal

FIRE PROTECTION IN NATIONAL
FORESTS



BURNED TIMBER, LOLO NATIONAL FOREST, MONTANA. YOUNG YELLOW PINE AND RED FIR KILLED; ALL VEGETATION AND HUMUS BURNED OUT OF THE SOIL.



EFFECT OF HIGH WIND AND FIRE ON A HEAVY,
STAND OF WESTERN PINE IN THE COEUR
D'ALENE NATIONAL FOREST



FIRE PROTECTION IN NATIONAL
FORESTS

GETTING TOOLS FOR FIGHTING FIRE. ARAPAHO
NATIONAL FOREST

FIRE PROTECTION IN NATIONAL
FORESTS



HOW RAILROAD RIGHTS ARE CLEARED FOR PROTECTION, LOOP IN MILWAUKEE ROAD ON NORTH FORK OF ST. JOE RIVER, COEUR D'ALENE NATIONAL FOREST, IDAHO



FIRE RUNNING IN UNDERBRUSH, UMATILLA
NATIONAL FOREST, OREGON



FIRE PROTECTION IN NATIONAL FORESTS TRENCHING FOR BACK-FIRE TO SAVE BUILD-
INGS. FIRE REACHING TRENCH BEFORE
BACK-FIRE COULD BE STARTED

prosecutions for violation of federal and state fire laws. The idea that forest fires could not be extinguished has largely been dispelled and a vast amount of good accomplished by the actual fire fighting in which forest users and residents in and near the national forests have engaged, and many people who in years past have been careless about fires, now realize the damage caused by fires and from experience the hard work necessary to extinguish them.

CO-OPERATION.

Before the creation of the national forests little or no effort was made in the states in which there are now national forests, either to prevent or extinguish fires. One result of the protection in the forests and the educational activities of the Forest Service has been to interest the states and lumbermen's associations, and indirectly to encourage the formation of associations for fire protection. The Service has constantly endeavored to co-operate with all such organizations. At the present time Washington, Oregon, Idaho, and Montana are taking an active interest in fire protection, and are co-operating with the Forest Service.

This cooperation usually provides for such an arrangement of patrol as to prevent needless duplication, for mutual notification in case of fire, for the division of the cost of fighting fires in accordance with the acreage burned over under each jurisdiction, for the appointment of federal officers as state wardens without salary in order that they may assist in the enforcement of state laws, and the appointment of state officers as federal guards at a nominal salary in order that they may have the authority of federal officers on lands belonging to the United States.

A number of fire associations in the states named and composed largely of lumbermen, are cooperating in a similar way. In a large number of cases in addition, there is very helpful cooperation from the owners of timberlands, frequently in the form outlined under cooperation with states. In the case of small holdings it may not, however, go further than mutual notification of fires, and assistance in case the holdings of either party to the agreement are threatened.

The cooperation secured with railroads because they are responsible for 30 per cent of the fires on the forests has already been mentioned.

Further cooperation of great benefit is the assistance given by people regardless of their own immediate interest in the national forests, from the standpoint of the protection of public interests. This cooperation usually takes the form of notification of fires to forest officers, and assistance in fighting fires when help is needed. A more infrequent form of cooperation is in effect during the present season on the Sierra National Forest. A stage company which operates over fifty miles of road within the forest on every day except Sunday, notifies forest officers of fires and provides an efficient patrol through a dangerous country in addition to the regular patrol.

PERMANENT IMPROVEMENTS.

Protection from fire on the large areas included in the national forests can never become thoroughly effective until suitable means of communication and transportation have been constructed, and properly located headquarters for forest officers have been provided. This system of improvements must eventually include extensive fire lines similar to those which have such a great value in the European forests. Practically every forest now has a permanent improvement plan showing as far in advance as the needs can be foreseen, improvements necessary for fire protection, and for every other

form of administration. For fire protection the means of communication and transportation are probably of the greatest importance under present conditions. For communication the telephone is most important and the time it saves is easier to comprehend when it is realized that in some cases mail service from New York to San Francisco is as quick as from a supervisor to a ranger, and in many cases it is several days hard riding from the headquarters to the more inaccessible parts of the forest. Up to June 30, 1910, something over 6,600 miles of telephone lines had been constructed for the Forest Service, at the rate of approximately 2,000 miles per year during the last three years. During the year ending June 30, 1911, the amount of telephone construction was considerably in excess of 2,000 miles. In the more accessible forests there are available many miles of privately owned lines. In addition the Forest Service has cooperated in the building of the new lines, exchanging telephone poles and a free right of way for the free use of the line for official business. The benefits of telephone lines in ordinary administration, and particularly in protection from fire, are incalculable, and have already saved many times over to the people of the United States the money expended in their construction. As a temporary expedient other means of communication, of which the heliograph is probably the most important, have been tried to some extent. There are, however, grave objections to the heliograph. It cannot be used at night or when the atmosphere is too smoky and the need for it may be the greatest. It is often difficult to obtain men who are familiar with the Morse code. It is reasonable to suppose, therefore, that it will gradually be replaced by the telephone, except under unusual circumstances.

Since the mileage of railroad within the national forests is small, transportation must be almost entirely over roads and trails. Thousands of miles of roads constructed by individuals, counties, and corporations existed before the forests. The Forest Service has cooperated with counties in road building by allowing the free use of timber necessary for road construction and by actual work. Many miles of roads have been constructed to market timber purchased and in connection with other uses of the forests. In addition the Service had before July 30, 1910, constructed in excess of 1,200 miles of roads and 13,600 miles of trails. Trails were constructed during the three years preceding June 30, 1910, at an annual rate of about 2,300 miles.

It has sometimes been found advisable in order to secure maximum present benefits from comparatively small sums of money merely to locate, blaze and post the trails, clear sufficiently for travel, and plan for their improvement and completion at a later date. Large areas have thus without delay been made comparatively accessible to patrolmen and fire fighting crews.

The rather diversified objects of trail making, and the same conditions hold more or less true of roads also, are to allow forest officers to get from one place to another by the easiest route and that which is shortest in time; to make possible effective patrol, for which trails necessarily follow the high ridges, extend to prominent peaks suitable for lookouts, and to openings from which good views can be obtained; to so locate and construct trails that in strategic places they may be valuable for fire lines; and to provide for ready access to large bodies of valuable timber in remote and comparatively inaccessible regions. A fire on the Lolo National Forest during the year 1910, in which, for a successful attack, it was absolutely necessary to build 32 miles of trail, illustrates the importance of trails for fire protection.

Before June 30, 1910, more than 1,000 headquarters for forest officers had been built and 247 purchased thereby placing a large number of men in

good locations for administrative work and incidentally for fire protection. Many of these have already, and eventually many more will be connected with the supervisor's office by telephone. Pastures have been fenced at practically all of the headquarters, so that horses are easily available in case of need, and similar pastures at many strategic points throughout the mountains are a great convenience in patrol and fighting fires.

An exceedingly important form of permanent improvement work which has been done largely during the past two years, is the construction of lookout stations on commanding peaks. The amount of work necessary varies greatly and may be no more than the lopping or cutting of a few trees which hide the view, or the fastening of spikes or steps to a tree trunk for a ladder. The more elaborate fire towers or lookout towers consist either of wooden or steel towers of varying height according to the need. The equipment of lookout stations also varies greatly, from the naked eye of the patrolman to an elaborate range finding apparatus on the Arkansas National Forest where, by a system of accurately placed and numbered wires, it is possible by triangulation and specially prepared maps to locate fires within comparatively small areas. Other stations are provided only with a map which may or may not be oriented, or a compass.

During the last two years a large number of tool boxes have been placed at strategic points through the forests. Obviously the judicious distribution of sufficient quantities of the proper kind of tools saves an enormous amount of time in getting to fires.

Very little work has been done by the Forest Service in the construction of fire lines, chiefly because of the immense area under administration and the great cost of construction, and up-keep of any adequate system. Something, however, has been done by cooperation in southern California where watershed protection is so vital to the interests of the fruit growers. To a small extent simple and cheap fire lines, often little more than the burning of brush and other inflammable material, have been constructed around dangerous areas of slash. Roads and trails often serve as fire lines, as does also the work which railroad companies are doing on their rights of way.

In order that the fire menace may not be increased by the cutting of timber, every timber sale contract approved in the Forest Service provides for some disposal of the brush and debris from the cutting. Where there is very little danger from fire and it is silviculturally advisable, limbs are frequently lopped so as to lie close to the ground and decay in the shortest possible time. Where, however, the danger from fire is great, purchasers are usually required to pile the brush so that it may be burned easily and without damage to the remaining stand. Some contracts provide also that standing dead trees shall be cut even though it is almost certain that the stub does not contain merchantable timber. This is advisable because of the fact that burning stubs scatter sparks badly. It has been found on one of the forests in the southwest that the cutting of dead stubs does not cost more than 21½ cents per thousand feet board measure for the timber actually removed. The burning of brush by the Forest Service is usually inexpensive, and in one case in a yellow pine stand on a southwestern forest, cost only 31½ cents per thousand feet board measure. In the heavy Douglas fir in the northwest where it is necessary to cut almost clean, temporary fire lines have been constructed around the sale area and any trees that may be left and the slash has been burned. This burning of the brush and consequent exposure of the mineral soil produces conditions favorable to the reproduction of the desirable Douglas fir, rather than the comparatively undesirable species.

Minor improvements are the development of water where it may be of assistance for administrative purposes, and hence for fire protection and on a few forests, the improvement of camping places in such a way that they will be attractive to transients, and at the same time will reduce the menace from fire.

(This article will be concluded in November.)

WHAT OREGON IS DOING TO PREVENT FOREST FIRES

By C. S. CHAPMAN.

SECRETARY AND MANAGER, OREGON FOREST FIRE ASSOCIATION

OREGON, the greatest timber state in the union, with one-fifth of all the standing timber in the United States, has been among the last to adopt progressive measures for preventing destruction through forest fires. That this trouble is being speedily remedied, however, is strikingly shown by the record made up to the present writing, for though 1911 has seen many fires and those of the latter part of August have been serious, in no case has there been failure to promptly attack them, and in few instances has serious damage to green timber resulted.

Contrary to the opinion of many people, Oregon has not for some years past been a state absolutely lacking in forest fire protection. Private owners in no small numbers can point with pride to the fact that as a result of careful patrol and readiness to spend any amount necessary for fire fighting, they have never sustained any loss through fire. Others, however, can boast of no such record, for until the past two years large areas existed, scattered through the state, where no patrols were maintained, on which fires gathered such headway as to prevent their control when they reached points where the careful owner had provided protection in an endeavor to save his own timber. These gaps have now been closed to a large extent, though not all of the state is yet adequately protected.

With a view to securing better protection, and at the same time save the trouble involved in maintaining individual patrols, Oregon timber owners two years ago started a movement to form cooperative patrols. This plan had worked well in Washington and Idaho. It not only allows any owner to share in the expense of looking after the timber, no matter how small his holdings, but the wardens over a wide territory being distributed through one agency does away with duplication of effort, and consequently the maximum protection at the minimum cost is secured.

Under this plan the question of insurance also comes in advantageously. If owners over a large territory agree, in addition to patrolling the land, to jointly fight all fires which occur, it is certain that no heavy burden of expense will fall on one company or individual in any one year. The plan comes as near to giving insurance on timber as any that can be arrived at.

A number of good cooperative patrols are now working successfully in the state. Notable among these is the Coos County Patrol Association, covering all of Coos and portions of Curry and Douglas Counties. The Klamath-

Lake Counties Patrol Association, confined to these two counties, also has an enviable record for achievement. There are also cooperative patrols in Polk, Jackson and Lane Counties, all doing excellent work. Under informal agreements between owners in the same locality, cooperation on a less extensive scale is also practiced; while in many other cases individual owners have their lands patrolled.

In the aggregate there are 350 men patrolling Oregon's timber lands outside the national forests. The state has about 60 wardens in the field, and all that is now lacking to give the state the most complete protection is a thorough organization of all forces so that lost motion will be eliminated. To bring this about is one of the aims of the Oregon Forest Fire Association, for it must be acknowledged that the serious losses of last year can be traced quite as directly to lack of organization in protective work as to lack of patrolmen. This Association, started two years ago, now represents approximately two million acres of the heaviest timber in the state. It has for its object the encouragement and betterment of patrol, and educational work looking to a better and more general understanding of what Oregon's timber resource means to citizens of the state and the consequent need of safeguarding this asset. The association constitutes the central agency to which its members report fire losses, or the measures needed in their sections to prevent fires. It is in a position to cooperate with other agencies engaged in similar work and to point out needed legislation looking to the perpetuation of our timber supply. Patrols are managed by the association for out of the state owners at the actual cost of putting them on. This during the past summer has been taken advantage of in numerous instances.

The formation of additional local patrols has not been as successful as had been hoped for, but the increasing interest in this subject leads to the belief that very shortly the entire timbered area will be systematically patrolled under some such system.

DANGER PLACES ELIMINATED

Two of the most fruitful sources of fires in Oregon are slashings and old burns. The latter are particularly hard to manage. These areas come up to brush and ferns, and since they receive the direct rays of the sun it becomes very easy to start fires in such places during the dry months. Once started they will burn with great intensity and rapidity. In the past it has been the custom of some owners, and this custom is now quite generally adopted, to burn off such areas early in the spring, thus eliminating the lighter and more inflammable material which later is a menace to the surrounding country. This practice becomes unnecessary once the area has come up to young trees which thoroughly shade the ground and thus retain the moisture. Strips in the timber along trails or roads can also be burned to advantage and this will prevent the carelessly thrown away lighted match or cigar from starting a fire. Timber owners now realize fully that careful preparation for the fire season and the elimination of dangerous places is as necessary as careful patrol later on. It generally happens that conditions reach a stage toward the end of the season where fires can be very easily started. This results in a large number of fires at the same time, which taxes the supply of available men and draws a large number of patrolmen from their districts to the fires then burning, thus making it possible for new ones to start. By careful preparation the number of fires which can become started is cut down, and this helps materially to handle the situation later.

Telephone communication can now be had with most patrolmen. This saves each year hundreds of dollars in time and money. Many miles of line

are each year added to reach out of the way points, and as a precautionary measure few things exceed in importance the telephone systems.

STATE AID A STIMULUS

The last session of the legislature passed a most excellent forest fire law, carrying with it an appropriation of \$60,000 for the two years, and creating a state board of forestry and the office of state forester. Previously, while a law good in its provisions had been on the statute books, there had been no funds for its enforcement and it speedily fell into disrepute. One of the first things to accomplish under the new law was to instil into the minds of the people a wholesome respect for its provisions. This is being accomplished through the efforts of the state forester and his deputies. Burning dangerous slashings without permit, or the leaving of burning camp fires, is no longer tolerated, and careless citizens are promptly brought to justice. The law is not intended to hamper the rancher who wants to clear his land during the summer, the camper who gets his vacation in the mountains, nor the logger who through his operations is furnishing labor for hundreds of people. It is intended, however, that all parties in the timbered sections use such precautions as will prevent fires starting. This can be done without extra cost or inconvenience and is necessary in order that destruction of property and possibly loss of human life shall not result.

The support and interest of the state has proven a decided stimulus to forest protection in Oregon. Timber owners no longer feel that they are alone in their fight against carelessness in the use of fire. There is every reason why states and counties, as well as the federal government, should aid very materially in preventing the needless destruction of standing timber, since it pays a large proportion of the taxes and is a resource which contributes very largely toward the upbuilding of the country. Forest fires in their results can truly be likened to the pests attacking our fruit trees or vegetables, or diseases making inroads on our live stock industry. Let these latter things happen and the states and counties take immediate steps to remedy the evil. But our timber, so long a drug on the market, has not yet been fully appreciated as an enormous factor in the upbuilding of the state. When its importance is realized Oregon will feel warranted in appropriating not thousands but hundreds of thousands of dollars to safeguard its greatest resource, the timber.



UTILIZING TROOPS IN THE NATIONAL FORESTS

By GEORGE M. CORNWALL.

THE loss of timber in the national forests by fire in 1910, according to Forester Graves in his report to Secretary of Agriculture Wilson, was the greatest since the national forests were created, aggregating six billion feet. The fires covered an area in excess of three million acres. The value of the timber destroyed is estimated at twenty-five million dollars. In addition to the property loss by the nation, seventy-six Forest Service employes gave up their lives. The cost of fighting these forest fires aggregated about one million dollars or less than one per cent of the property saved. The severest losses were experienced in Idaho and western Montana, while the damage inflicted in the national forests in Klamath County, Oregon, was very considerable. At one time last August, Forester C. S. Chapman, at Portland, reported 27 miles of fire line on the Crater National Forest, sweeping madly forward, gathering force and momentum with every mile, and practically carrying everything before its devastating advance.

The states of California, Oregon, Washington, Idaho, and Montana contain practically one-half of the standing timber of the United States. The estimated stumpage of the national forests in these five states is placed at three hundred and eighty-nine billion feet. This timber belongs to the nation. To the Forest Service is entrusted its safe keeping from fire. Up to the present time the amount of money available for the building of roads and trails and the establishment of fire lines has been altogether too limited. Last year 5,500 miles of road and 1,600 miles of trail was built. Considering the extent of the territory to be protected, the available means at command of the Forest Service has been only a bagatelle.

During the terrible fires which devastated northern Idaho and western Montana, the writer happened to be in Spokane, Washington. The exact date was August 4th. The smoke was rolling into the city. The sun assumed a sickly yellowish glare as its rays penetrated the smoky atmosphere. The air during these terrific forest fires seems to lose its freshness—the oxygen seems to be wanting—burned up. Things take on an uncanny and exaggerated appearance. The face of nature looks different.

The noon edition of the Spokane Chronicle brought the unwelcome announcement of the death of several brave Forest Service employes, hemmed in by the fires—caught like rats in a trap, while defending the nation's property. The difficulty of getting firefighters was mentioned in the dispatches. Employment office blackboards carried announcements of the necessity for men to go to the front to fight fires. Men fitted for the arduous task were difficult to get. In the meantime the fires were increasing in number. It occurred to the writer that the government should lend the use of the troops. The idea was presented at the meeting of the Western Pine Manufacturers' Association, and a resolution adopted. The Western Forestry and Conservation Association, through its president, A. L. Flewelling, was brought into action, and the following telegram forwarded:

"Probably never in the history of Montana, Idaho, Oregon and California have the losses from forest fires in the National Forests been more destructive than are now raging, and which threaten, unless checked, to destroy millions of dollars of property and endanger the lives of our citizens. We most earnestly suggest that the national troops located in the above states be at once rushed to the scene of the conflagration and co-operate with the Forestry Service with a view of checking and preventing as far as possible, a recurrence of the terrible menace to the property of this nation.

"Western Forestry and Conservation Association, representing Montana, Idaho, Washington, Oregon and California."

(Signed) A. L. FLEWELLING, *President*.

(Signed) GEORGE M. CORNWALL, *Secretary*.

In two days President Taft placed at the disposal of the Forest Service officials a sufficient number of troops to assist in the suppression of the forest fires within the confines of the national forests.

In nearly every instance the troops gave an excellent account of themselves. Accustomed to discipline and provided with the proper equipment for provisions and means of transportation, Uncle Sam's boys acquitted themselves nobly. The officers generally took an interest in the work and instructed their men to take their instructions from the Forest Service officials. There was no clashing of interest. The nation's property was at stake—the soldiers and forest officials were American citizens. They had an interest in its protection.

Perhaps, in this connection, a letter from C. S. Chapman, now manager and secretary of the Oregon Forest Fire Association and until recently in the Forest Service with headquarters at Portland, may prove of interest.

MR. CHAPMAN'S LETTER.

Mr. Chapman says:

"In further reference to the matter of use of federal troops in fighting forest fires, last summer while in charge of the national forest district comprising Oregon, Washington and Alaska, the large number of serious fires made it practically impossible to secure sufficient local men to fight them. The federal troops were, therefore, secured in an effort to save valuable timber threatened by fire. These men performed invaluable services. Not only did they fight fire, but their presence in the country had a very desirable effect, as it led to the belief that a situation requiring federal troops was indeed serious.

"Many of the boys entering the army are brought up on farms and are used to hard work as well as being of a practical turn of mind. It should be an easy matter to train these men into an efficient fire fighting corps. Last summer's experience with the troops leads me to believe that under the supervision of men skilled in fire fighting they can be used to advantage."

As a result of the success attending the use of troops as an auxiliary to the Forest Service, a resolution was passed by the Western Forestry and Conservation Association asking Congress to establish regular filled posts, contiguous to the various national forests, and thereby bring the troops within easy range if their services should be required. The legislature of California also passed a resolution along the same line, the troops having rendered very efficient service in California last year in connection with fires in the national forests in that state. General Wood, chief of staff, opposed the use of the troops for Forest Service duty on the ground that he believes it is subversive

of discipline and that it interferes with the time allotted for maneuvers. Secretary of War Stimpson is also opposed to the diversion of the troops for forest protection on the same grounds as General Wood. Ex-Secretary of War Dickinson was inclined to look with favor on the proposition.

From personal interviews with the officers and soldiers who took part in forest fire fighting, the results showed conclusively that there is no better training than an actual fire-fighting experience for the men. It makes them self-reliant. They find themselves. With a little training their services would prove invaluable. The outdoor life and exercise is healthful and wholesome. It brings them into close touch with civilian life. It helps them in every way. The opportunity for drilling is not removed, and from every standpoint the utilization of the troops for regular forest protection should be encouraged. While actively engaged in fire fighting, additional food, clothes, and pay should be allowed. This incentive in itself, coupled with a break in the monotony of post life, would be a sufficient inducement to create a desire for forest service duty in the minds of men. The duty of the army is to protect and safeguard life and property—and certainly the saving of the nation's timber should not be considered beneath the duty of a true soldier, but rather his privilege.

If President Taft, during his term of office, will provide for the regular employment of the troops to protect the national forests he will have done more in the interest of true and practical conservation than any other single step that has yet been taken. The splendid results which followed from his action last year in this direction would seem to be sufficient justification to carry forward the work so auspiciously begun.



BASKET WILLOW CULTURE IN MARYLAND

By C. D. MELL.

BASKET willow culture in Maryland has long been profitable, but of late years New York state and the eastern central states have entered so strongly into competition with Maryland that the margin of profit has been considerably reduced. One advantage that growers here have over the states farther west is that nearly all of the basket and wicker furniture factories are located in the larger cities near the Atlantic coast and principally in Baltimore, so that the cost of transportation is very little. Growers of basket willows in Ohio, Indiana, Illinois, and Kentucky have to put up their basket willow rods in bundles of 75 to 125 pounds and pay high transportation rates to get them to the factories in Baltimore, Philadelphia, New York and Boston. At the same time good basket willow land in Maryland can be bought for \$75 to \$100 per acre, while in the eastern central and other basket willow growing states land suitable for growing a successful crop sells for considerably over \$100. This makes a still greater difference in the net returns from the plantation. Moreover, the most experienced basket makers always contend that the willows raised in Maryland are far superior to those of any other part of this country. They are reputed to be tougher, more pliable, and for this reason often bring from one to two cents per pound more than willows grown, for instance, in New York or Indiana.

The yield of basket willows here is on the average higher than elsewhere, which is partly due to superior cultivation and partly to the peculiar adaptability of soil and climate. As high as 3,000 pounds (weight when peeled and dried) of good rods are raised on an acre, but to do this a favorable season, good soil, and superior cultivation must be supplied. On the poorer land the average is about as low as 1500 or 2000 pounds to the acre, while an average crop year after year on the good lands is probably about 2500 pounds. A poor crop often consumes the greater part of the profit of a good year, because the labor required to harvest the basket willow is entirely manual, and in the spring when the time comes for cutting and peeling the rods this labor is generally scarce and high. This cuts down the grower's net profit if his crop turns out poorly. Occasionally if the crop is very poor the grower will not attempt to harvest it, but lets it grow, cutting it at the end of the second year.

Basket willows this year promise to net the farmer a fair profit on his investment. A good deal depends, however, upon the peeling, bleaching and drying. The snowy white, sap-peeled rods are much desired in making high grade basket ware, and rods so bleached, carefully graded in quantity and height classes and put up in neat bundles, will bring more than those bunched in a careless manner. To secure the desired color the rods must be spread out in the sun immediately after peeling until they are bleached the desired shade, after which they are put into a drying room.

There is another point which the grower must bear in mind. The peeled rods are placed on racks and left to dry, where they must remain until they are dry enough not to heat after bundling. Great care must be taken to prevent them from getting wet after they have been bleached or while in the process of drying. There is no definite period required for this drying, a good deal depending upon the weather and the size and kind of willows.



AMERICAN GREEN WILLOWS IN
PIT PREPARATORY TO PULLING



BASKET WILLOW CULTURE IN
MARYLAND

PATENT LEMLEY WILLOW ONE
YEAR OLD AT ARLINGTON, VA.



AMERICAN GREEN WILLOW SIX YEARS OLD AT
LAUREL, MARYLAND

BASKET WILLOW CULTURE IN
MARYLAND

UNDER MINNESOTA'S NEW FOREST LAW

By W. T. COX.

THE Minnesota Forest Service was organized in May, 1911. It was then that the state forestry board, in accordance with the Act of April 12th, appointed "a trained forester" and turned over to him the administrative work of the department. The forest law is a comprehensive one,* carefully drawn and passed upon previous experience in this and other states. It provides an annual appropriation of \$75,000, in addition to certain specific appropriations made for the care and protection of the state forest reserves and parks.

The task of the service is enormous. Minnesota originally had approximately 33,000,000 acres of forest. Of this 5,000,000 acres have been cleared for farming, leaving 28,000,000 acres of forest land in the state. This is exclusive of the lakes lying within the forest region. There are about 4,000,000 acres of Indian reservation and national forest lands in the state, leaving 24,000,000 acres extending north and northwestward from the mouth of the St. Croix three hundred miles to the Canadian boundary, and for more than three hundred miles along the boundary from Lake of the Woods to Lake Superior. This enormous area, now largely cut over and much of it burned, it is the duty of the state forest service to protect from fire.

Since the organization of the service last May considerable progress has been made. The state has been divided into twenty fire districts which embrace the coniferous forest region. In charge of each of these districts is a district ranger, selected solely because of his experience and ability as a woodsman—the type of man commonly employed as logging superintendent. These men are located at the most convenient points for reaching the different portions of their districts and keeping in touch with their patrolmen and with the public. The rangers have selected the headquarters for their patrolmen and assigned to each of them a definite area to patrol. Both the rangers and patrolmen have been instructed in the field as to their duties.

Many lookout towers have been erected, and a larger number, as well as some telephone lines, are in process of construction. Trails are being cut out and canoe routes improved to furnish quick means of communication in districts heretofore practically impassable. Wagon roads are being encouraged by substantial assistance in the actual clearing out of the timber where the roads will serve as valuable fire lines. Several fire lines other than wagon roads are being cut out in places where they will play an important part in preventing the spread of fires in dangerous localities. Canoe routes are being mapped as well as improved, and portages improved so that they will no longer have to be dreaded by the traveler. Good camping places are designated, with the idea of persuading people to use the same sites and thus mini-

*The text of the Minnesota forest law was published in *AMERICAN FORESTRY*, May, 1911, page 307.

mize the danger of greatly strung out or scattered camp fires along the routes of travel. Crude but safe outdoor fire-places are thrown together by the patrolmen for the use of campers in localities much used.

The railroads have been brought to realize that a businesslike system of fire protection is a paying proposition, and they have organized special forces of patrolmen mounted on speeders and placed where the district rangers feel that they will be most effective. These places are, of course, on the heavy grades and along sections of the tracks peculiarly susceptible to the starting of fires. The companies are also paying much more attention than formerly to the question of spark arresters on their locomotives. At least two new spark arresting devices of great promise have been produced within the last three months by the master mechanics of railroad companies within the state.

In the construction of new railroads, wagon roads, trails, etc., the brush is no longer piled along the outside of the right-of-way to serve as a fire trap, but is required to be burned as construction proceeds.

In the summer logging being done this season on a large scale because of the large quantities of timber killed by last summer's fires, the slash has been either burned as the logging progressed, or piled ready for burning late in the fall or early in the spring, depending upon the character of the timber. The most economical and satisfactory method for the disposal of slash differs widely in different types of forest, so that the method to be used in each case is left to the district ranger to prescribe, the idea being to cooperate with the lumber companies in working out the best method for each individual tract. There is no disposition to be arbitrary, but there is a persistent desire to get rid of the slash which constitutes a fire danger.

Cooperation with the settlers is being brought about. The settlers are coming to realize the importance of forest fire prevention to themselves and the community, and in many localities are rendering valuable assistance to the rangers. Volunteer fire brigades, similar to the ones maintained in villages, are being organized in communities where this is feasible. Control of forest fires will be much more effective when the rich agricultural lands of northern Minnesota are thickly settled, thus cutting the forest region into belts and irregular tracts, and confining it to the poor, sandy, or rocky land, which alone should be maintained in forest.

The state has made a good start in the matter of creating parks and forest reserves. Principal among these are Itasca Park, which includes the source of the Mississippi, and Burntside Forest in the wild rocky region north of the Vermilion Range. It is the duty of the state forest service to care for and improve the state reserves, which are rapidly coming to be appreciated for their beautiful lakes and pine forests, full of ideal spots for summer camps.

The rangers serve as special game wardens without pay, and the regular game wardens of the game and fish commission serve as special forest rangers, thus increasing the force of men devoting their efforts toward making safe and accessible the great forests of northern Minnesota.

PROGRESS OF FORESTRY IN WISCONSIN

By FRANK B. MOODY

ASSISTANT STATE FORESTER

THE past season has closed a year of the greatest activity in forestry matters in the history of the state. Roads, trails and fire lines have been built, making protection possible in regions of greatest fire menace; a patrol system has been inaugurated; plantations of pine have been established and a nursery has been started. The people have been aroused to the necessity and are beginning to realize the feasibility of a system of fire protection and of reforestation, and the state legislature has granted appropriations which will allow a sure and fairly rapid development of both.

By an act of the state legislature in 1903, a non-political state board of forestry was created consisting of the president of the state university, the dean of the agricultural college, the director of the state geological survey and one member appointed by the governor. The members of this board hold office indefinitely and receive no salary, although traveling expenses are allowed when actually engaged in work pertaining to forestry. The following year a state forester was appointed by this board and in 1906 an assistant state forester was selected by civil service examination.

By various acts of the state legislature and by orders of the state board of forestry the forest reserves were increased from 40,000 acres in 1904 to 254,000 acres in 1908, all of which are north of Township 33 and scattered throughout seventeen counties in the northern part of the state. The scattering agricultural land in all counties except Vilas, Forest, Oneida, and parts of Price and Iron, was appraised and placed on the market. The proceeds of such sales go into a forest reserve fund which is available for the purchase of other lands to be added to the permanent reserve area in the above-named counties which lie at the headwaters of the Wisconsin and the Chippewa Rivers. These lands are for the most part cut and burned over pineries with scattered patches of pine reproduction. All money received from the sales of land, timber, and other forest products is credited to the forest reserve fund and is at the disposal of the state board of forestry for improvements, protection, and for the purchase of interior holdings. This year (1911) an appropriation was granted allowing \$50,000 annually for a period of five years, to be used exclusively for the purchase of land. The annual appropriation was increased from \$9,800 in 1903 to \$35,000 in 1911 to provide for a patrol system, permanent improvements, and reforestation. In 1906 the federal government granted the state 20,000 acres of public land north of Township 33 as an addition to the state reserve. Proceeds from the sale of any portion of this grant go into a fund which can be used for reforestation only.

At the present time the reserve comprises 380,000 acres of which a small part is timbered and the remainder is cut-over land and swamp. The cut-over lands were logged by railroad, leaving a network of old grades which can be readily transformed into wagon roads and fire-lines. Within the permanent

reserve area are hundreds of lakes which form the reservoir of the Wisconsin and the Chippewa Rivers. These lakes are ideal summer resort sites, many of which can be reached only with great difficulty. Thousands of people take advantage of the more accessible places during the summer. Since the state owns nearly all the land bordering on these lakes and the revenue from timber sales is small, it is the policy of the board to lease cottage sites and open up roads to increase accessibility. The roads are laid out in such a way as to make the country more easily patrolled for fire protection and at the same time serve as routes to resorts.

This spring a patrol system was organized in which the federal government co-operates with the state. The territory to be covered includes about sixty townships, of which about one-half should be well patrolled during the dry season on account of railroads, fishermen, hunters, and settlers. The other half need not be watched so closely, for there are practically no settlers and very few sportsmen get into this country, as traveling is difficult and no railroads pass through. These two halves are not in solid blocks but are irregular interwoven areas. Each ranger is assigned a district, varying from a little less than one township to about two townships, the size being governed by the fire menace and ease of patrol. Where railroads and good wagon roads make the area very accessible, there is usually a telephone system and one ranger can keep in touch with all parts of a large district. Where the opposite conditions prevail, the ranger is assigned a much smaller area to patrol. A number of steel-framed watch-towers placed at vantage points aid the rangers to keep so large a territory well under surveillance, and telephones connecting the towers with ranger stations and with the assistant state forester's headquarters at Trout Lake, make the system quite efficient for fire protection.

The federal government in co-operating with the state is furnishing funds for rangers' salaries only. There are at present twelve rangers whose salaries are paid from this fund and twelve, including one head ranger, paid from the state funds. All state rangers are selected from applicants who have passed a state civil service examination and are appointed for the entire year. They are given police powers to prevent setting of fires, but are not authorized to act as game wardens. Each ranger has authority to hire as many men as necessary for fire-fighting, and these men are paid immediately from a fund for temporary assistance, made available to the assistant state forester. When not on patrol duty, the ranger's work consists in building roads, fire-lines and trails, cutting posts and telephone poles, getting data for correction of existing maps and for the new features of a more up-to-date map.

The rangers who receive pay from the federal government are hired for about five months of the year during the season of greatest danger from fire. They have the same powers of police and authority to hire men for fire-fighting as the state-paid rangers. Provision was made for them to help in fire protection work when patrol is unnecessary.

The head ranger has general supervision over both state and federal rangers and acts as inspector, visiting each ranger about once in ten days. He has, however, no additional powers or authority. The very nature of his work demands that he have saddle horses and these he furnishes and feeds.

The ranger's expenses are paid while away from his own station, and when on road work or fire-fighting with a gang of men, the state furnishes bed and board for all men in camp. At the present time rangers are not required to keep horses for patrol work, as traveling in most districts has been difficult and is about as fast on foot as on horseback. After this year,

however, main roads will make horses more efficient and rangers will be required to supply them.

It is planned to build a road system in which the main roads will checker-board the whole reserve area in such a way that they will be about three miles apart or as nearly that as the many lakes and swamps and the abandoned logging road grades will allow. From the main roads, fire-lines will be made to cut the areas into plots of about forty acres each. These plots will very often be extremely irregular and in order to make strategic points accessible, trails will be brushed out. The main roads are for the most part built by removing the ties from old abandoned logging railroad grades and leveling off the surface with plows and drags. The result is an excellent wagon road with grades rarely exceeding seven per cent, all for a cost of about \$50 per mile. Wherever possible, fire-lines are built by simply dragging old railroad grades after the ties have been removed. Where roads will become main thoroughfares, care is taken to build them well for permanent use, while less expensive fire-lines and trails are made when protection is the only reason for their construction. Sometimes it is necessary to cut lines between natural fire protections such as lakes, wet swamps, etc. Here, the lines are made about thirty feet wide, the brush cut out and burned and the line plowed and dragged. There are now about 100 miles of main road and about 50 miles of fire-lines. The latter were built to protect plantations and what little natural reproduction survived the big fires of the past three years.

The reforestation policy was vigorously pushed this year. A nursery site was chosen, centrally located for field planting and well protected by forest on three sides. An area was cleared off for a nursery with a capacity of about one million seedlings annually; a water system using the Perry pneumatic pump was installed, and a main pipe and laterals laid so that a fifty-foot hose would reach all the beds. The beds were laid out 4 x 12 feet with 18-inch paths. Each bed was surrounded by a frame covered with poultry wire and provided with two removable top screens, one of poultry wire and the other of lath. Over 200 beds were made, of which 84 were planted to white pine, 64 to Norway pine, 28 to Scotch pine, 14 to western yellow pine and 16 to Norway spruce. Most of the seed was sown broadcast, a small part in drills. Germination was rapid on account of the very warm spring and effects of damping off soon appeared. In calculating the amount of seed to sow, an allowance was made for loss due to various causes and as this is the first nursery established in this region, a rather large factor of safety was used. Damping off caused the greatest damage, but even that was slight. The white pines suffered a loss of 10 per cent; Norway pine, the seed of which was collected near the nursery site, did not show any effects of the disease, while that collected in other localities suffered a loss of five per cent. About fifteen per cent of the Scotch pine and forty per cent of the Norway spruce were killed. The western yellow pine was not affected. The nursery was almost entirely free from weeds during the whole growing season, due perhaps to the fact that the ground was broken up for the first time and weeds that grow in free sunlight had not had a chance to seed up the area, and those that had formerly grown there would not stand the full light. The rodents did not bother the first planting, but a few beds that were sown later in the summer were entirely destroyed. The final counts show that a factor of safety slightly too large had been used and where a million seedlings were expected, about one and one-fourth million were produced. These will be transplanted when two years old.

During the three or four years necessary for these seedlings to grow to a suitable size for field planting, plantation operations will be carried on with

stock purchased from commercial nurseries. The first forest planting ever undertaken by the state was done this spring with stock of this sort. Planting areas of about forty acres each were chosen which would require the minimum amount of artificial fire-lines to protect them. They were close enough together so that all work could be done from one camp. About fifty men were hired for the planting season. They were mostly "lumber jacks" who had never before planted trees and were naturally careless with their work, necessitating close supervision. The planting was done with mattocks in the more favorable open spots between stumps and masses of brush where the spacing was unavoidably irregular, but approximated six feet each way. There were nearly 200,000 trees planted, of which 182,000 were white pine, 5,000 western yellow pine, 5,000 Norway spruce, and 1,100 Norway pine. The white pines were three-year-old seedlings and the others were four-year-old stock which had been in the transplant beds two years. They were vigorous healthy-looking plants, but on account of careless packing for shipment, a rather large percentage were received in poor condition. The work of planting extended over a period of ten days, during which the weather was cloudy and rainy, making an excellent planting period. The month following was dry and hot, while the remainder of the summer was wet and cool. The results for the season's planting were very favorable. Counts of living and dead plants on half-acre plots show that 60 per cent of the white pine are alive, 75 per cent of the Norway pine, 55 per cent of the Norway spruce and 98 per cent of the western yellow pine.

Permanent headquarters for the assistant state forester have been built at Trout Lake, Vilas County, near the large central nursery and in the geographical center of the state forest area. Here the assistant forester is in touch with all the rangers by telephone and from here all parts of the forest are easily reached by either railroad or wagon road or trail. This will be the central distributing point for supplies, tools and equipment for the rangers. From here instructions will be issued to them, and orders given for field work of various kinds, in fact, a great deal of the business of the woods will be transacted at this point. Should the University of Wisconsin establish a ranger school, a matter now under consideration, the field instruction will be given at the Trout Lake headquarters. Negotiations are under way for equipping this station with apparatus for measuring rain-fall, wind velocity, humidity, etc., in co-operation with the United States Weather Bureau. This fall enough seed will be collected to furnish the nursery already established and the one that will be started in the spring at Tomahawk Lake. The site has been chosen and plans made for the new nursery to produce 500,000 plants annually. Next spring about 60,000 trees will be planted in the field and the work on telephone systems, roads and fire-lines will be continued.

HOW ONE NATIONAL FOREST IS PROTECTED

By D. N. ROGERS.

THE Plumas National Forest, comprising 1,433,600 acres in the northern Sierra Nevada Mountains of California, is divided into thirteen administrative districts. Each of these is in charge of one or more rangers, depending upon the amount of business in the district. It has been found from experience that upon eight of these districts, including nearly all of the western part of the forest lying west of the Grizzly Range and Indian Valley, the danger from fire is particularly great. Accordingly, in planning a system of fire protection for the entire forest, the preparation for patrol was confined for the most part to these districts. Considerable past experience upon the forest with different systems of fire protection had shown that by the use of lookout points the effectiveness of the patrol could be greatly increased. A careful survey was therefore made of the entire western section of the forest, and two peaks from which fires could be located upon nearly all the dangerous territory were selected as lookout points. Headquarters were provided for the lookout men who would be stationed on these peaks during the entire fire season, and telephone lines were constructed from the lookout peaks to the supervisor's office at Quincy. New telephone lines were also constructed in addition to those already in use, so as to give direct connection from the supervisor's office to every ranger's district upon the forest.

In order to make the lookout from these peaks as effective as possible, three maps of the entire forest were prepared, one for the supervisor's office and one for each of the lookout points. To assist in accurately locating fires, these maps are sectionized, and also show the towns and the topography by peaks, rivers, creeks, valleys, etc. Upon the maps used on the lookout peaks, the courses are laid off at a distance of two degrees apart, upon a circle around the lookout point, the courses being indicated by lines extending from the point of observation to the exterior boundary of the forest. The map is properly oriented and attached securely to a permanent table. From these direction lines the course of each fire is determined by use of an alidade, and this information is then telephoned in to the supervisor. The map in the supervisor's office is practically a duplicate of the lookout map, except that both lookout stations are shown and the direction lines are drawn from each so that they intersect upon that part of the territory which can be seen from both lookouts. When a fire occurs which can be observed by both lookouts, it is thus possible to locate it by means of the intersection of the courses which are telephoned in by the lookouts.

During this season, fires which have occurred at not too great a distance from either lookout point, have been located by intersection exactly. Where the fires have occurred at some distance, location by this means has been made within less than one-quarter of a mile. The accuracy with which fires can be located by this means is a matter of very great importance in the effectiveness of the lookout peaks, since the ranger upon whose district the fire occurs can be notified of its exact location, and can consequently reach it without unnecessary delay.

In addition to the lookout men, a riding patrol is maintained upon each of the fire districts. This patrol consists of one or two men, depending upon the fire danger in that particular district. The patrol men ride over the district each day, always reporting to the supervisor by telephone two or three times a day in order that the supervisor may keep in touch with them and that they may be notified of any fire reported by the lookout men. The patrolmen not only keep a careful lookout for fire, but also make it a point to interview campers and forest users, ascertaining their names whenever it seems advisable and giving instructions concerning camp fires, etc. The riding patrol is exceedingly effective in securing the campers' compliance with the fire laws, in view of the fact that the penalty for leaving camp fires unextinguished is now very heavy and there is always more or less uncertainty as to just when the patrol man is liable to appear.

In addition to the lookout men and riding patrol upon the fire districts, fire companies are being organized which will be in readiness to respond to the fire call at a moment's notice. They consist of from 10 to 15 picked men, who may be employed at the saw mills, or at mining or logging operations, situated throughout the fire district. The number of these companies depends of course upon the fire danger and upon the resources from which they can be drawn. In some of the districts the companies are made up from among the ranchers who live in the district permanently.

In the organization of the fire companies, especially at the mills and in the case of lumber and mining companies, an agreement is entered into with the boss of the operating camp to the effect that certain men, who have been previously selected, shall respond immediately to any call for assistance for fighting fire within certain parts of the fire district. If a fire is discovered by the operating camp, the fire company immediately proceeds to the fire without waiting for orders from a forest officer. It is previously understood that the men composing this fire company will be paid by the government for services rendered for fighting a forest fire which does not threaten the property of the lumber or mining company. The particular advantages of this organization are that the men understand fire fighting thoroughly and respond quickly because they are sure of receiving their pay, while at the same time through previous arrangement no unnecessary inconvenience is caused their employers.

In addition to the patrol of the national forest administrative districts, the Service is working in co-operation with the Western Pacific Railroad Company, whose right of way extends across the entire forest. The company holds its section foremen responsible for immediate action in fighting any fire which may occur along its right of way. The train engineers and conductors are instructed to report to the nearest station agent all fires which they observe. The station agent then promptly notifies the foreman in charge of that section of the right of way upon which the particular fire is located, and in addition notifies the supervisor by telegraph or telephone in order that, if necessary, the Forest Service may render assistance. Through this co-operation the Western Pacific officials often communicate to the supervisor reports upon fires which are entirely without their right of way, but which may not have been observed by the forest patrol force.

The effectiveness of the fire protection system upon the Plumas National Forest is very well indicated by the fact that out of the 31 fires which occurred during the month of July, the total area burned over was less than 111 acres; 75 per cent of these fires burned over less than one acre each, and the largest fire burned over an area of less than 20 acres.



SEED HOUSES OF
NORTHEASTERN FORESTRY
COMPANY, WILLSBORO,
NEW YORK



WHITE PINE SEED-
LINGS, FROM
BROADCASTING IN
1906



CRATES FOR CONES
IN OVEN HOUSE,
NORTHEASTERN FORESTRY
COMPANY, WILLSBORO,
NEW YORK



STATE PLANTATION OF SCOTCH PINE MADE IN
1905, WITH TENT OF FOREST GUARD, NEAR
LAKE PLACID, NEW YORK



EASTERN STATES FORESTERS

IN PLANTATION OF SCOTCH PINE ELEVEN YEARS
OLD, ON STATE LAND NEAR LAKE PLACID, NEW
YORK



PART OF A TWENTY-FIVE-ACRE PLANTING OF RED PINE, SEVEN YEARS OLD. A CHEERING OUTLOOK FOR THE FUTURE OF PLANTING IN THE NORTH-EAST



EASTERN STATES FORESTERS

IN STATE NURSERY, LAKE CLEAR, NEW YORK
SHOWING THIS SEASON'S SEED BEDS



YELLOW BIRCH IN VIRGIN MIXED FOREST, NEAR
RAQUETTE LAKE, NEW YORK

THE SUMMER MEETING OF EASTERN FORESTERS

By HUGH P. BAKER.

ON July fourteenth and fifteenth, the Association of Eastern Foresters held a successful meeting in northern New York with headquarters at Saranac Lake. This is the first time that the organization has held a meeting in which others than those connected immediately with state work were included. Feeling that the society could not only broaden its sphere of action and influence, but greatly strengthen and increase the usefulness of its work, the state foresters decided to include practicing foresters in all other lines in the eastern states. This brought in for the first time this year a number of men from various forest schools and several foresters in the employ of large corporations and in private work.

The day previous to the meeting the writer, with a member of the Northeastern Forestry Company, had the good fortune to jog along slowly up the western shore of Champlain, stopping at one or two small nurseries operated by this company, and at Willsboro looked over their new seed houses built last year. These houses are very complete indeed and probably the best of their kind in America. The large house shown in the accompanying illustration has a capacity of six thousand bushels of cones. These are spread out on racks made of lath, which are light and easily adjustable, extending in tiers from the floor to the ceiling. The small house is fifteen by thirty and is occupied by the ovens in which the cones are heated after removal from the larger dry house. The method used for the removal of wings from seed is not an entirely practical one, because of the amount of hand work involved and the problem of developing cheaper and quicker methods is a little difficult to solve because of the size of the plant. The Appel concern in Darmstadt having very much more extensive ovens has developed machinery which does the work satisfactorily, though they figure on some loss from crushing and mangling of the seed.

After leaving Willsboro we stopped for a few hours at Bluff Point, where Mr. H. S. Bristol, forester for the Delaware & Hudson Railroad, is developing an extensive forest nursery. This nursery is excellently laid out and has an effective water system, but the extremely sandy nature of the soil rather leads one to feel that we are sacrificing in this country certain important conditions in the nursery to get a soil that is easily worked and warm. When a season is as hot and dry as the past one, nurseries located in such situations are sure to suffer and the matter of supplying proper amounts of plant food in the soil is an extremely important question which is probably solved easier by the railroad than by others in nursery work in the east, because of cheap and easy transportation.

At Plattsburg the party of three was increased by several from across the lake, and the next morning a very interesting run was made into the thick of the Adirondacks to a little station beyond Saranac Lake, where the entire party of eighteen foresters began a series of unusually attractive excursions under guidance of Mr. C. R. Pettis, superintendent of state forests, and his

assistant, Mr. Howard, the hosts for the meeting. We went at once through some excellent Scotch pine plantings four years old and also some white pine and European larch, the average cost of planting of which was eight dollars per acre. From Raybrook we drove on toward Lake Placid and took another very instructive walk through more extensive plantings of Scotch pine made in 1905 in which there is almost a perfect stand. The growth of this species has been so satisfactory that one is convinced almost that the Scotch pine has a future in the United States. The accompanying illustration shows a portion of this plantation with the tent of the forest guard.

After dinner at Lake Placid, we went back to Lake Clear Junction and there visited what is probably the most extensive and oldest plantation of Scotch pine in the United States. The view of the party together is taken standing against this plantation. The planting was made in 1902, spacing six by six feet, and many of the trees are now fifteen feet high. Mr. Pettis explained that the Scotch pine does not do as well where duff covers the sand; also that white pine had failed here as elsewhere in the immediate region, because of the formation of a secondary root system, causing the entire vitality of the tree to go into the formation of adventitious roots. Here a considerable number of white pine had been removed and burned, because of infection by blister rust. This plantation of Scotch pine with one or two plantations of red pine and white pine, seen the next day at Paul Smith's, are among the finest examples of reforestation in the United States and compare very favorably indeed with reforestation of similar lands in either Germany or France.

Following the examination of plantations, several large nurseries at Lake Clear Junction and at Saranac Inn were visited. One of the accompanying illustrations shows the party in the nursery at Lake Clear Junction examining this season's seed beds. In a number of beds of white pine, it was estimated that there were nine thousand seedlings in a space four by twelve feet. Ants were causing some injury in spruce beds, but where they were not working the average stand in four by twelve feet space was estimated at fifteen thousand. The average for spruce seedlings in beds of similar size in 1910 was given as fourteen thousand. Damping-off had started in the red pine and as sulphur seemed to cause baking of the soil, dry sand was used with very satisfactory results. After seedlings were well started, six pounds of bone meal were used to the beds of pine, but no bone meal was put on the spruce. Here and there in the pine slight injury had been caused by irregular scattering of the bone meal and by too much lying upon or about the seedlings. The soil was a sandy loam and this spring a very heavy dressing of manure was given previous to the working up of the beds. The treatment with manure and subsequent use of bone meal has produced unusually strong seedlings, stocky and of good color. In fact, the number of seedlings produced per square foot exceeds, if anything, the number produced in the average forest nursery of central and southern Germany. It is probable that a larger number of seedlings may be produced in limited situations where the ground has been worked for a long period and is exceedingly rich, but there will be little reason for increasing the production per square foot above that now obtained in these nurseries in northern New York. It was stated that in 1910 the acre and three-fourths at Lake Clear Junction produced six million seedlings. Following a visit to the seed beds a twelve-acre transplant nursery was looked over in which there were standing one-fourth of a million seedlings to the acre. It was estimated that the cost of the transplanted seedlings at the end of the third year was two dollars to two dollars and fifty cents a thousand.

The evening was given up to a business meeting at Saranac Lake in which

plans for the future were discussed and a number of new members were elected. It was decided that the membership of the association apart from those in state service or connected with schools of forestry should be limited to men who would be likely to be of value in the society. A day and evening meeting will be held in New York city sometime in January for a thorough discussion of topics of special interest in forest work in the eastern states.

A steady rain on the morning of the fifteenth dampened the ardor of a number who left for the south and east during the forenoon. About noon a run was made to Lake Clear Junction and thence to Paul Smith's, where an excursion was made to unusually extensive experiments in seed spot planting. After lunch at the camp of the forest watch, these spot plantings were gone over carefully and some interesting results seen. Scotch and white pine had succeeded best in the seed spots and the loss with the other species in most instances was complete. Adjoining the area upon which the spot planting had been done is a tract of twenty-five hundred acres planted to white and Scotch pine. Considerable replanting was necessary here because of loss of previous years due to poor planting and dryness. One very interesting feature of the work in this vicinity was a side hill upon which white pine had been broadcasted. The seeding was done in 1906 on a slope of about thirty per cent with a southeastern and northwestern exposure. The results were good, as can be seen in the accompanying photograph, which compares size of seedlings with a hat. Upon the return to Paul Smith's a three-acre planting of bull pine seven years from seed was seen. While a growth of brakes was exceedingly heavy, this pine seemed to be doing excellently and, no doubt, has great promise for very dry situations throughout the eastern states. Of all the plantations visited, a tract planted to red pine was the most interesting and attractive. Twenty-five acres near the above-mentioned planting of bull pine was put out seven years ago and there is to-day almost a complete stand. The ground is a very gravelly drift soil well adapted to the red pine and the heavy annual growth of brakes has not seemed to injure the development of the plantation in any way. The pine, as shown in accompanying cut, is now overtopping the brakes and within a short time there will be almost perfect forest conditions. If those skeptical as to the future of planting in the eastern states will visit this red pine plantation all doubt will be removed and in its place will come enthusiasm and confidence as to the future of forestry in this country. The plantation convinces one also that the red pine should be used more where soils are right and that its growth during an entire rotation will probably compare favorably with any conifer that can be used in the eastern states. The meeting was closed at Paul Smith's after several strenuous athletic contests.

The next day three of the party ran in to Raquette Lake and looked over some of the virgin forests along the west shore. The accompanying illustration is quite typical of present conditions of the forest in Township 40. There is a great deal of mature timber and very light growth of saplings and seedlings to insure a satisfactory forest after the older trees are removed by either natural or artificial means.

These meetings of the eastern foresters mark the beginning of a different type of forestry meetings in this country. They are in reality conferences between the men who are trying to solve definite problems, supplemented by opportunities to observe and study what is going on in the various parts of the east. Much of the success of this meeting was due to the energetic thoughtfulness of the host, Mr. Pettis.

The following men were present: Samuel N. Spring, state forester of Con-

necticut; James W. Toumey, professor in the Yale Forest School; H. H. Chapman, professor in the Yale Forest School; Ralph C. Hawley, professor in the Yale Forest School; F. W. Besley, state forester of Maryland; F. William Rane, state forester of Massachusetts; R. T. Fisher, professor in the Harvard Forest School; F. F. Moon, professor of forestry at Massachusetts Agricultural College; C. R. Pettis, superintendent of state forests, New York; Hugh P. Baker, professor of forestry in the Pennsylvania State College; Austin F. Hawes, state forester of New Hampshire; Charles P. Wilber, state fire warden of New Jersey; Alfred Gaskill, state forester of New Jersey; William G. Howard, assistant superintendent of state forests of New York. And as guests, the following: H. S. Bristol, superintendent of woodlands, Delaware & Hudson Railroad Company, New York; J. G. Peters, United States Forest Service.





SPRUCE AND BIRCH IN VIRGIN FOREST, RAQUETTE
LAKE, NEW YORK. TYPICAL MIXED FOREST OF
NORTHERN APPALACHIANS



CAMP DOCK, LOOKING EAST FROM ASSEMBLY TENT



MICHIGAN AGRICULTURAL COLLEGE
CAMP

STEAM LOADER, LOCATED NEAR THE CAMP.
THIS AVERAGED 25 CARLOADS A DAY

STREET TREES

BY J. J. LEVISON, B. A., M. F.

FORESTER IN CHARGE OF THE TREES IN THE PARKS OF BROOKLYN

THE park superintendent of today is facing a new problem. Those old neglected street trees are now gradually becoming his care and the people are even more particular about them than they are about the parks, because in the street tree the citizen takes a proprietary interest. It is his tree; he sees it daily, is directly benefited by it and expects it to be thrifty and sightly. The park superintendent must meet this problem and if he meets it well, it is that much to his credit. What then are the fundamental principles of street tree planting and care and how shall he go about the problem?

First of all the street trees as well as the park trees should be controlled by the municipality and placed under the jurisdiction of a single head. *Municipal control* is the only way of securing uniformity in planting—very essential on streets—it is the only way of controlling insect and fungus invasions over large areas and of doing anything systematically and at the right time. *Co-ordination of effort*, that is, combining all city tree work into one bureau is also the only way of insuring the absolute eradication of insect and fungus pests, of securing uniformity and efficiency in methods, material and apparatus and of getting the work done at the least possible cost. All city tree problems both in the parks and on the streets are interdependent and divided effort would mean loss of time, money and trees.

With the work co-ordinated, place the responsibility of all tree matters on a *professional forester*, a man trained in the science of forestry and arboriculture and one of considerable experience in park work. His duties will be to see to all planting, spraying, pruning and cultivating. He will establish a municipal nursery, test the various insecticides and fungicides, install the best apparatus and enforce the city tree ordinances. He will organize the office work, plot the street trees on a map and advise citizens on their tree problems. He will issue permits for tree removal and private tree pruning, study the local tree problems, collect tree statistics and promote public interest through lectures and writing.

The enactment of a good city *tree ordinance* is the next step. There are a number of cities that now have such ordinances in force and the new one may be modeled from those. Your tools to work with are then provided and if your trained expert is a good one, you can leave the details of carrying out the work to him. Oversee his work occasionally, give him the benefit of your wider experience and back him when necessary because in the beginning of all such work there frequently appear many cases of opposition from citizens who either for selfish motives or otherwise try to force their own views in the matter of handling technical tree problems.

The attention of the forester will first probably be directed to the care of the existing trees rather than to the addition of new ones.

Spraying for leaf-eating insects may be his first work. Street trees growing under less favorable conditions than park trees are naturally weaker and

more susceptible to insect attack. Street elms without care very seldom escape attack from the elm leaf beetle and such trees as the horsechestnut and linden are titbits for leaf-eating caterpillars. Let all such spraying be done early, while the insect is young and susceptible to the poison. It is also important to look into the chemical and physical value of the insecticide you are using.

A few years ago I found one of the best known brands of arsenate of lead to contain as little as 4 per cent of arsenic oxide, whereas it should have had 15 per cent or more to be the least effective. Since then, we have been purchasing our spraying material subject to chemical and physical tests and have been paying considerably less than we had been paying before.

Success in spraying will, moreover, depend not only on the value of the insecticide and upon how early in its feeding stage the insect is attacked, but also on the thoroughness with which the work is done. The kind of apparatus used will also make an appreciable difference, for a barrel pump is too slow for the amount of labor used to operate it and a very heavy wooden tank such as is commonly used for woodland spraying would prove too sluggish and cumbersome in going about the city streets.

In late summer and early fall, *pruning* will be in season. The men should then be trained in the fundamental principles of the work and furnished with printed hints on the necessary precautions in climbing trees and removing branches. We have had little booklets published on such topics for our men and find them very helpful. Close cuts and application of coal tar to the wounds should always be insisted upon and above everything else, do not let them prune more than is necessary. The tendency on street trees has generally been the other way to the great detriment of the trees.

Cavities caused by some old neglected horse-bitten wound or by an improperly made cut, are more common in street trees than in park trees and the present tendency is to indiscriminately fill them all with cement. This work is expensive and in many cases unjustified. It is particularly true of trees on the streets because there the trees are frequently of poor species and the cavities so neglected that the absolute elimination of diseased wood is utterly impossible. There the decay would keep on developing after treatment with the same rapidity as before. Cavity filling is justifiable only where the tree is a much valued specimen, where the filling can serve the practical purpose of eliminating moisture and where every trace of diseased wood can be thoroughly removed before the filling is inserted. In many cases the proper use of the chisel or gouge alone without the filling will eliminate all disease and leave the wound in a position where moisture will not collect. The absolute eradication of all infested wood from a neglected cavity is often impossible and in many cases where this is true, the axe is by far the safest and most practicable tool. Street trees especially should be cut down as soon as they become the least dangerous or when their trunks become hollow or badly infested with disease. For, as soon as the citizen notifies the authorities of the condition of his tree, all responsibility is shifted on the city and law suits are sure to follow in case of any subsequent damage.

Spring is the time for *planting*, but the preparations for planting should be commenced in the fall. Fall is the time to purchase trees and leave them standing labeled in the nursery for spring delivery. Holes in the sidewalk about 5 feet long and 3 feet wide and 3 feet deep may be opened in the fall and the ashes, tin cans and beer bottles frequently composing a street soil may be changed for a cubic yard of rich black loam.

In selecting the trees for street planting consideration should be given not only to the species but to the *specimen* as well. The specimen tree should be about 2½ inches in diameter, should possess a straight trunk, a definite leader

and a symmetrical crown, commencing at 7 to 9 feet from the ground. It is sometimes difficult to find trees that will in every respect meet these specifications and it might then be well to agree to a smaller diameter, but to insist on well-formed specimens. Individual perfection, symmetry and uniformity are fundamental principles in successful street planting. For this reason, it is important to plant trees of the same species on the same street or at least on a stretch of several blocks; to have all trees of uniform size and to set them out at equal distances apart. Thirty feet apart is a suitable distance for most street trees and a tree like the elm should be allowed 60 feet. It is in the realization of just such points wherein lie the advantage in having a municipality undertake such work. If left to the citizens to do this individually, the trees will be planted either too close or too far apart. Many species will be mixed on the same block and many blocks will have no trees at all.

As to the *selection of the species* that will, of course, vary with the local conditions. In a general way, however, persons in the East will find the *Oriental sycamore* the hardiest of all for street planting. The sycamore has lately been slightly afflicted with a leaf blight (*gloeosporium nevisseum*), but the disease has not become general enough to do serious damage. The *Norway maple* is another tree equally desirable. The oaks, though of slower growth at first are by far the noblest and most long-lived trees. The *red*, *pin* and *scarlet* oaks are the three best species for street purposes. The red oak is faster growing and least fastidious in its soil and moisture requirements. The pin oak is most beautiful when its low pendulous branches are disturbed as little as possible and when its roots can get plenty of moisture. The tree is therefore best adapted for suburban sections. The scarlet oak is worth the trial for its persistent and brilliant foliage. The *ginkgo* has demonstrated its adaptability to poor soils, to unfavorable city conditions and its resistance to insects and disease. It should be tried to a greater extent for street planting than it generally is. The English elm is another tree doing well in many large cities.

There are a number of trees that are planted for their admirable qualities of either form, color or beauty of their flowers, but requiring special favorable conditions and care, they should be chosen with a greater degree of hesitancy than the above and planted preferably in the suburban sections rather than in the heart of the city. The principal of these are the sugar and red maples, European linden, horsechestnut, American elm and tulip tree.

The *sugar maple* has a symmetrical form and combines many shades of color in the fall, but requires plenty of moisture. In the vicinity of New York city, the trees of this species planted in the heart of the city are rapidly dying off and there is no other cause attributable for this condition except the excessive evaporation from the leaves against the meagre quantity of moisture taken in by the roots from the impoverished street soil.

The *red maple* and the *linden* are both moisture-loving trees, and the latter is a favorite food for insect pests. The *European linden* is the better tree for street planting. The *American linden* grows very straggly in the vicinity of New York though it seems to do better further south. The *horsechestnut* prefers a rich soil and is subject to a fungus disease, which discolors its leaves causing them to drop in midsummer. It is also a common victim of "slime flux," a disease that causes the flow of sap from crevices in the trunk. The tree is used extensively abroad for street planting, but for reasons just stated, should be used more sparingly in this country. The *elm* has the noblest form of all our shade trees, but should be planted on wide avenues, in suburban sections where it can find a deep, rich, moist soil and plenty of unvitiated air. The tulip tree compares favorably with other species in form and attractive-

ness but is so exacting in its soil and moisture requirements that only young specimens should be used and its planting restricted to suburban sections.

The *objectionable trees* for street planting are all the *poplars*, the *silver* and *sycamore maples*, the *catalpa* and *male ailanthus*. The poplars are very short-lived trees. They are dangerous in windstorms and grow so fast as to require constant cutting back. At a certain age their roots upset the sidewalk and their fine rootlets clog the neighboring water and sewer pipes. Their leaves drop very early in the fall and if the species is of the pistillate kind, the catkins falling on the sidewalk become a danger and a nuisance to pedestrians. The silver maples are constantly full of dead wood, are subject to boring insects and are short-lived. The sycamore maple is a favorite of boring insects in the vicinity of New York though in other places it has escaped these pests. The variety of ailanthus tree that bears the male or staminate flowers generates a strong, rather oppressive odor, but if the pistillate form is chosen, the tree will produce a beautiful head and will grow in places where no other tree will grow.

Such are the principal problems of those charged with the care of street trees. I have not attempted to dilate on the details of the work because they are too numerous and because, as in every thing else, their solution will often depend more upon the judgment of the forester in charge and upon the local conditions than upon any rules that may be laid down. But whatever the problems do not let us forget that they can always best be solved by one equipped with technical knowledge and experience and that the trees are worth the effort since they are always valued by the citizen and ultimately lead to a better appreciation of the parks themselves.



EDITORIAL

THE FOREST FIRE SEASON

THE season of greatest danger from forest fires is drawing to a close. For the next six months we may breathe a little easier and if we are well advised we shall profit by experience and consider wherein our defences have been found to be lacking and provide for greater safety next year. With this thought in mind, we are publishing this month several practical articles dealing with systems of fire protection, especially in the national forests. We in the United States are not doing a fraction of what we ought to do to prevent and control forest fires. But we are doing much and doing it well, and we shall doubtless improve both the quality and quantity of our work each year now that we have really taken the problem into serious consideration.

Fortunately, not every year do we have such terrible spectacular conflagrations as aroused the whole country in 1910. But the loss each year, and especially during such dry seasons as we have been having for several years past, is heavy; the liability to outbreaks like that of last year is always present; and the time to provide for them is before they happen. That there have always been forest fires is shown by the testimony of the ancient forests, but it is unavoidable that the increase of population, the spread of human activities into the forests, should increase the danger far beyond natural conditions. And the loss becomes more serious as the forest area decreases and the size and value of our timber trees becomes less.

As was pointed out by Dr. Deckert, the German observer, in an article, the translation of which was published in this magazine a few months ago, the forest fire problem in the United States presents peculiar difficulties and will probably always remain with us as a present danger. Nevertheless, we cannot admit that American skill, energy and ingenuity are not equal to the task of reducing the danger and the loss to a comfortable minimum. The problems of organization, method and equipment have been taken up on a tremendous scale by the United States Forest Service on the national forests, and by many of the states in their own territory. Large timberland owners in the northwest and northeast are co-operating with the government officials in a way most promising of results. When we have developed a sufficient leadership of capable fire chiefs, supported by a body of trained men, with an ample equipment of the best tools, machinery and vehicles for reaching and fighting forest fires; when all our forest regions are so laced with roads and trails that fires can be reached promptly and with the smallest expenditure of energy; when lookouts with range finders and telephone connections are generally installed and experienced patrols maintained, so that fires may be detected in their incipency; when finally—though it may well stand first in importance—the people as a whole have been educated to a sense of individual responsibility for preventing the start or spread of damaging fires, we may expect the holding of forest property to be a much less anxious owner-

ship than it now is, and forest conservation will receive one of the greatest encouragements that can be given it.

This is not a Utopian program. All of its elements are now in hand, and steady and persistent efforts will accomplish the complete result, even in the face of national carelessness and individual irresponsibility.

NEW ENGLAND'S HOPE DEFERRED

NEW ENGLAND is deeply and unpleasantly stirred by the failure of the Weeks law to accomplish any immediate results in the protection of the White Mountain forests, and especially by the possibility which has assumed alarming proportions that relief may be impossible under the law as it now stands. The state of feeling will surely become visible and audible when the people of that section generally become aware of the facts which are now known to comparatively few. A common impression still is that a law has been passed and anxiety may now be laid aside. That is a customary American attitude.

It is generally known that the first direct proposal to purchase forests in the northern and southern Appalachians was sidetracked by an opinion of the judiciary committee of the House of Representatives that such a purchase would be unconstitutional, but that forests might be purchased on the watersheds of navigable streams if it could be shown that the maintenance of these forests was necessary to protect or promote the navigability of such streams. It is needless here to discuss the merits of this opinion. Its validity as a final judgment is very doubtful. On this point constitutional lawyers differ widely. It was maintained by some strict constructionist lawyers on the committee and outside of it with entire sincerity. It also furnished a good instrument to use with less sincerity in the sharp political game which was played in the House to kill the measure.

The Weeks bill was constructed to meet this view, for so close was the fight in the House that it was useless to go against the judiciary committee. In order to further meet the views of many members who did not know just where they stood, it was provided in the bill that the Geological Survey should pass upon lands, the purchase of which was proposed, reporting as to their relation to the navigability of the streams upon whose watersheds they lie. It may easily be understood that the Survey did not care to be drawn into a matter which had already involved the foresters, the engineers, and the Weather Bureau in endless warfare, but the task was reluctantly assumed in obedience to the will of Congress.

The practical result is that while the experts of the Survey admit the serious menace of the destruction that is being done in the White Mountains and that this ought to be checked, they could not, according to the last information available, by the method of investigation which they have adopted, connect it with the navigability of the streams heading in those mountains, and there is at present reason to expect a report unfavorable, or only partially favorable on the White Mountain watersheds. The position taken by the Survey is understood to be that the relation of each watershed must be determined by direct examination of that watershed—that no other factors are of scientific value and that what has happened on other watersheds in other parts of the world cannot be used to forecast what will happen here. On this ground it must be admitted that the White Mountains stand small chance. The ultimate results of progressive denudation and of the cutting of hard-

wood are only beginning to show themselves, for the lumbering of the past will cut a small figure compared with that of the next twenty-five years, and the final consequences must, we hold, be judged with this in mind and by comparison with the ultimate effect of similar causes on other watersheds the world over.

Certain fundamental facts are regarded by the best expert opinion in New England as having a direct bearing upon the case, quite as significant as anything that can be determined from local examination of soil and topography. The first of these is the general agreement, both in Europe and America, that forests protect the run-off of streams and that on steep mountain slopes this protection is greater than elsewhere. Furthermore, it may be accepted as an axiom that the destructive agencies of nature, frost, moisture and wind, combined with gravitation, are at work in the White Mountains as in all other mountains of the world. It is further well known to local students of the question that the danger of denudation in the White Mountains is greater than in many other mountain regions because of the extraordinary growth of the paper and pulp industries that consume its principal species, spruce and fir. These grow in nearly pure stands on the high slopes. Added to this is the fact that owing to the exhaustion of the hardwood supply in some other parts of the country, the cutting of hardwood on an extensive scale has begun in the White Mountains. Hitherto many of the slopes have been protected by the hardwoods.

Fire, following cutting, has a serious effect upon the thin soil of the White Mountain country. It has rendered large areas in the White Mountains permanently barren and has set back for years the productivity of others.

It is common observation among woodsmen in the White Mountains that the spring run-off is earlier and more rapid from cut-over and burned over areas than from those not cut over. Many small streams once running free the year around have become permanently dry or mere courses for spring freshets, this being noticeable in areas that have been cut-over.

In view of these facts it seems inconceivable that the consequences which have followed such conditions in other mountain countries should not follow them in the White Mountains. And if this is true, the protection which the White Mountain forests afford to the rivers of New England is plain, and their preservation would certainly come within the scope of the Weeks law. If the experience of other countries, France, Spain, China and Syria, for example, does not furnish an analogy by which we may profit, it seems to us that it is incumbent upon those who deny that analogy to show the reason why. Thus far no proof has been offered—only denials.

It seems necessary to again emphasize the fact that whatever protection can be afforded to these New England forests must be afforded soon. Otherwise the combination of natural and human forces to which we have referred will place these hills beyond successful maintenance except as stone quarries. From the beginning of the agitation for the Southern Appalachian forests in 1899, the first support of which came from New England, New England has loyally supported the interests of the whole Appalachian region in this long struggle. To the people of this section the great human interests involved far transcend questions of bare scientific fact or abstract legal considerations. The passage of the Weeks law was hailed as the accomplishment of a great result. Its failure will be regarded with a disappointment which can hardly be described. The country has expressed its will that the mountain forests of the east should be preserved and maintained in perpetuity. That will must not be nullified.

FEDERAL TROOPS AND FOREST FIRES

THE advantages accruing from the use of federal troops in fighting forest fires in the national forests are very ably brought out by Mr. Cornwall in his article which appears in this issue of AMERICAN FORESTRY. In a time of extreme danger and national disaster, such as existed in the forests of the west last year, the troops were a great help, and the War Department would no doubt be glad to help the Forest Service again if similar emergencies arise. The use of troops in times of emergency has occurred on several occasions, as during the San Francisco fire, and a precedent may be said to have been established.

While these extraordinary situations justify the use of national troops, there is ground for diversity of opinion regarding the regular assignment of troops to assist the Forest Service. It is pointed out that such a course would tend to hamper the development of the national forest organization and build up a system similar to that in the national parks. Such a result would obviously hinder the best use of the forest. The Forest Service already has a strong organization which combines fire protection and control with various other duties which are essential to the best management of the forest. The ranger force is inadequate in numbers, but it is trained to great efficiency. In times of fire danger, the resources of the Forest Service are augmented by men and tools from local residents, lumber camps, etc., and gradually a strong reserve is being built up with the regular forest force as a nucleus. It will soon be only in times of great fire danger such as last year that inexperienced men not on the reserve list will need to be recruited, or the regular troops called out.

A system under which the Army regularly helps the Forest Service protect the forests in Secretary Stimson's opinion would be bad. It is conceded that our army needs centralizing to permit of manoeuvres by large bodies of troops. To this end it is the aim of the department to abandon small isolated posts, but this would be impossible if the troops were distributed over the national forests. Another point is that fire prevention rather than fire fighting is the essential feature of an effective system and to assign privates in the regular army to patrol work would largely deprive them of true military training and not make for army efficiency.

The German forests are protected without the help of the large German standing army and we should consider well before breaking up our small army for regular forest fire duty. When emergencies arise, the troops can be called on and their services will be most helpful, but it will be a radical and perhaps dangerous policy to put even a small proportion of our army permanently into the national forests.

MAINE'S EXHAUSTED FIRE FUND

MAINE has for some time been held up as an example among the eastern states for its system of forest fire prevention and control. Its expenditures have been considerable and it easily secured the maximum allowance of ten thousand dollars from the national co-operative fund provided by the Weeks law. It was, therefore, something of a shock as well as a surprise to learn on or about the 10th of August that the \$68,000 protection fund of the Maine forestry district and the national appropriation of \$10,000 were

exhausted, and that two hundred patrolmen guarding lands assessed at \$45,000,000 had been laid off.

In a letter calling attention to existing conditions one paper manufacturer who had eleven thousand acres of timber growing which he had been handling conservatively is quoted as saying that he did not propose to hold timber land just to have the timber burned from lack of protection.

It is apparent that the exhaustion so early in the season of so large a fund, larger than has hitherto been available, calls for explanation. If the national government is to assist in this work it must know that the money is wisely and economically expended and that it is not wasted in a futile effort that will be practically suspended at a critical time.

Commissioner Mace issued a statement on the 19th of August in which he said that the situation was kept well in hand until the third and fourth of July, when the extraordinary conditions produced by and following the hot wave brought disaster. The statement continues:

"Realizing the danger the patrol force was increased and the already efficient patrol was, in some case, doubled. Nothing in the line of prevention was lacking and notwithstanding the department had retained the best men who had followed the work in former years, the worst fires occurred in the sections controlled and looked after by the men who had been connected with the State's forest service since 1903 when the first law was put into effect.

"The disaster was no fault, however, of the men, as the best service cannot cope against the elements which were decidedly against all that was being done, the cause assigned to some of the worst fires being lightning. It is hard to make many believe that forest fires are caused from such a source but there is plenty of evidence in the recent fires that lightning was the cause.

"The extremely hot weather, and the winds on some of the days the fires were at their height, drove the flames and sparks in all directions, causing many fires at the same time. Hundreds of men were called on and responded making an expense of from \$2,000 to \$3,000 a day continuing at this rate from 10 to 15 days.

"It was this immense expense covering the cost of fighting the fire added already to the unusually large force of patrolmen that so quickly exhausted the funds."

It is further stated that the expenses up to July 1 were unusually large, but "that with any kind of average weather and conditions the forest protection work could be carried on until the end of the season." In view of the statements quoted we are surprised to find the commissioner estimating the damage caused by the fires at only \$200,000, a much lower figure than others have estimated and one hardly consistent with his description of the magnitude of the fires.

Two points are suggested by consideration of the situation in Maine. The first is that Maine has not yet placed its forest commissionership outside of politics, a thing which must be done to secure a permanently capable administration. The second is that with this vast forest interest to protect the state, if it can be shown that the present expenditure has been well administered and the fund was really inadequate, should provide an emergency fund that could be drawn upon whenever extraordinary conditions, such as are claimed by Commissioner Mace to have arisen this year, occur, to the end that vigilance need not be relaxed during the whole period of fire danger. This is a vital matter in which no state can afford to be niggardly.

EDUCATION

Yale's New Professorship of Lumbering

R. C. Bryant, professor of lumbering in the Yale Forest School (this is the new professorship endowed by the lumbermen of the country at the instance of the National Lumber Manufacturers' Association) has issued a statement describing with much detail the course in his department. He says:

The instruction in lumbering proper is conducted by a lecture course for senior students given in New Haven from October 1 to March 1, and by practical field work in the South from March to the middle of June.

INSTRUCTION IN NEW HAVEN

The lecture course in New Haven is designed to give the student a clear idea of the general principles underlying the conduct of the lumber industry in the United States and a general understanding of economic subjects related to it. This lecture course is given four times a week during the fall and winter terms. The following subjects are among those covered:

1. Importance of the industry in the United States, brief historical review of its development, statistics of the industry, the future of the industry.

2. Planning a logging operation, methods employed, data required, and methods of obtaining it.

3. A comparative study of the methods of, and equipment required for, logging operations in the various forest regions. This covers all sorts of tools, vehicles, and machinery used in handling logs from the stump to the railroad or water.

4. Transportation of timber and other forest products by land and water. Methods, equipment required, value of each system.

5. Detailed study of logging methods in specific regions.

6. Log scales, scaling practice, and log grades used in different regions.

7. Types of manufacturing plants and equipment used.

8. Methods of manufacture.

9. Theory and methods of seasoning lumber.

10. Preparation of lumber for market in planing mills.

11. Methods of sale—trade customs.

12. Lumber grades and grading methods.

13. Lumber associations—objects and work.

14. Foreign and domestic markets.

15. Timber bonds.

16. Insurance for sawmill plants and timber.

17. Lumber tariff.

18. Cost-keeping methods.

19. A brief course treating of shingle, lath, clapboard, veneer, cooperage, vehicle stock, boxboard, excelsior, and charcoal manufacture, and the harvesting of tanbarks and turpentine orcharding follows.

The lecture work is supplemented and illustrated whenever possible with models, drawings, lantern slides, photographs, and other material that will more clearly illustrate the subject matter.

Professor Bryant's statement then calls attention to the close relation to training in lumbering of the instruction given by other members of the faculty, describing briefly the courses in land surveys and map making, forest law, wood technology, forest management, forest mensuration, construction engineering, silviculture, entomology, and diseases of trees.

The field work of the spring term of the senior year, which has since 1906 been spent on some large lumber operation is described at length. The camp and field work are in charge of Professors Chapman and Bryant. The statement continues:

The instruction given consists very largely of field work, supplemented by the few lectures necessary to properly explain the work in hand. The instruction covers the following points:

LOGGING METHODS

A detailed study of all phases of the logging operation of the company is made. This includes:

1. The methods of planning the logging operation.

2. The organization of the woods, labor and wages paid.

3. Railroad location and construction. Practice is given in laying out logging railroads and spurs on lands where the company will soon operate. The method and cost of railroad construction are studied first hand with the logging company's crew.

4. Felling methods and tools—Saw filing and care of tools. Daily output per crew and cost.

5. Skidding and hauling methods—where more than one system is used a comparative study of the efficiency of each is made



NEAR VIEW OF GENERAL
ASSEMBLY AND SMALLER
TENTS



INTERIOR OF INDIV-
IDUAL TENTS,
EACH 10X12
AND COMFORTABLY
EQUIPPED



GENERAL VIEW OF CAMP
FROM THE EAST.
BEHIND STOOD A
HEAVY FOREST OF
BEECH, BIRCH,
SUGAR MAPLE,
AND WHITE PINE

MICHIGAN AGRICULTURAL COLLEGE
CAMP



STUDENTS IN ASSEMBLY
TENT EXAMINING
ENTOMOLOGICAL
MATERIAL

STUDENTS OF THE
SUMMER SCHOOL.
THEY HAVE COM-
PLETED THEIR
SOPHOMORE
YEAR. TWO
OCCUPY A TENT
AND EACH TENT
MAKES A
WORKING CREW
WITH OUTFIT



THE EVENING HOUR OF
RELAXATION
BEFORE THE
CAMP FIRE

and tables prepared showing the amount of work performed in a given time under given conditions. A knowledge of the ability of men and animals under specified conditions furnishes a basis for the determination of their efficiency under other conditions. Costs per unit.

6. Railroad operation, log loading, train operation, unloading at mill pond, etc.; methods and cost.

7. Study of waste in logging incident to careless felling, high stumps, improperly cut log lengths, etc. How to determine actual waste and financial loss to the lumberman.

8. Efficiency in management.

9. Log scales and practice in log scaling.

10. Relocation of old land lines. Each student is given several days' work, under a skilled surveyor, in the relocation of old land lines to bring out difficulties attending this class of work and the necessity of great accuracy.

11. Topographic mapping. Considerable practice is given in the collection of data for and the preparation of a topographic map of a tract of 25,000 to 30,000 acres for logging purposes. The training aims at securing speed in the collection of data combined with sufficient accuracy for logging purposes.

12. Extensive practice is given in the various methods of estimating timber by ocular methods, and the principles underlying them.

13. Practice in marking timber for a second cut.

14. Studies of the rate of growth and preparation of a plan of management for yellow pine and other forests.

MANUFACTURE OF LUMBER

The students are divided into three groups and each group spends two weeks at the sawmill plant becoming familiar with the manufacture of lumber. Among the points covered are the following:

1. Character and equipment of the manufacturing plant.

2. Methods of manufacture.

3. Methods of seasoning lumber.

4. Planing mill equipment and dressing of lumber.

5. Practice in grading rough and finished lumber.

6. Study of defects in logs and their influence on the quantity and quality of lumber produced.

7. Labor organization of plant.

8. Organization and management of shipping department.

9. Markets and prices.

10. Waste in manufacture and possible remedies.

11. General efficiency of operation, improvements possible.

The results of the study of logging and manufacturing methods are embodied in

a report which forms the basis of criticism for the student's work and corrects any erroneous impressions that may have been formed during the study.

The object of the spring work is to bring the student into close contact with operations in the field, give him training in the performance of forest work, and to permit him to put into practice the knowledge gained during his attendance at the Forest School. He gains confidence in his ability to do things correctly and it provides an excellent foundation on which to build his future practical career.

A Forest School, and any other technical school, cannot turn out graduates fitted on graduation to assume responsible positions unless they have had previous practical training. The latter is a most essential factor in any technical profession. A technical training, however, does give a foundation on which a man may build to good advantage and which will enable him to become a more proficient practical man in a much shorter time than would be possible had he not had his technical training.

The lumber industry in the past has demanded a man skilled in many different lines, especially in engineering. The industry in the future will demand still more of the man who will be successful because he will be called upon to handle his product very closely, find new uses for his present waste products, plan for future crops of timber, and to practice forestry of a more or less intensive nature. In this work the technically trained forester will be invaluable to the lumberman.

Michigan Agricultural College Forestry Department Summer Term

The third session of the summer term of forestry given by the forestry department of the Michigan Agricultural College, was held on the estate of David Ward, Deward, Crawford county, Michigan, from June 21st to August 10th, 1911.

There were twenty-four students in attendance and four courses were given—one in civil engineering, which took up land plotting and rapid topographical mapping; one in entomology which consisted in the identification of forestry insects and a study of their life history; one in field methods which treated of the necessary equipment and maintenance supplies for men and horses in the field. In the last of these students were given practical work by being fully equipped for field expeditions and being sent out with their entire equipment packed on their backs, making camp and cooking for themselves. There was also a course in forest mensuration which consisted of making volume tables, height diameter tables, form factor tables for white pine, hemlock, sugar maple, and beech, laying out a plot of ten acres, cruis-

ing the same after handing in estimates, carefully going over the plot and measuring each tree on the plot and calculating the volume by different methods. As soon as this work was completed choppers felled the timber on the area and timber was measured and checks made on estimates and calculations. Practice was also given in cruising forty acre plots and 160 acre plots by the different methods. Much practice was also obtained in locating witness trees and boundary lines. Students had the opportunity to appreciate the extent of an area of 640 acres of heavily timbered stand.

The camp was located on the shores of Sand Lake, adjacent to the estate logging camp No. 18 which is operating in white pine with 110 men and 15 teams.

The students were housed in tents about five minutes' walk from the cook shanty of the main logging camp. There were ten tents 10x12, set at an angle of fifty degrees with the main assembly tent which was 23½ by 41 feet. All of these tents were equipped with a board floor. The individual tents, housing two students, were all equipped with board floors, two cots, study table, two chairs, lantern and lamp. Oil and matches were furnished. A yard man was employed to sweep the tents, fill the lanterns and lamps, fill the water pails each day, pick up about the camp and accumulate wood for the evening's bon-fire.

The hours kept by the students were the same as those kept by the logging crew, beginning with breakfast at five o'clock. Boats, guns and ammunition were furnished for the use of the students. A target range was laid out and records kept of the practice.

Dr. R. C. Allen, State Geologist of Michigan, was in camp and gave a series of lectures on topographical maps and mapping. Mr. R. S. Kellogg gave a series of lectures on general forestry topics.

The pictures reproduced on other pages give a good idea of the life of the school in camp.

University of Vermont

The University of Vermont is to be added to the list of those institutions giving instruction in forestry. A course in forestry is one of the regular courses in the Department of Agriculture. The plan common to many schools of agriculture of making the work of all courses identical for the first two years is followed here. In the last two years these courses are differentiated and the specialized subjects taken up. In the two years in which time is

given to forestry studies it is intended to train students for Vermont forestry in connection with and not apart from agriculture and to prepare for the graduate forest schools those who may intend to enter professional forestry. The special forestry training covers such subjects as dendrology, mensuration, technology, silviculture, and management; certain phases of botany are taught with a strong slant towards forestry; special engineering courses having forestry adaptations are offered; and two summer schools, one in forest engineering and one in forest management, wherein forest students spend a month each summer are held.

Iowa State College

Mr. Nelson C. Brown, deputy supervisor on the Kaniksu National Forest, in Idaho, has accepted the position of assistant professor of forestry at the Iowa State College, at Ames. Mr. Brown received his collegiate training at Yale, graduating in 1906. He immediately took up graduate work in the Yale Forest School and in 1908 received the degree of master of forestry. Since that time Mr. Brown has had wide experience in forestry work both in the east and in the west. His training and experience together with his instructional work in the Yale Summer Forest School, make him amply fitted for the work in his new field.

New York State Forest School

New York is again to have a State forest school. This time it is to be established in connection with Syracuse University. Residents of New York state for one year prior to matriculation will receive free tuition. The earlier New York forest school at Cornell, under Dr. B. E. Fernow's able direction achieved a high standard and graduated many good men. The regrettable discussion over the management of state forest lands is fast passing into ancient history, yet it is only a few years since it made a very stirring and angry note in the forestry world. It involved the school in the meshes of politics and the state withdrew its support, compelling Cornell to discontinue the school. Every honest and fair-minded man who knew the circumstances deplored the result, which ultimately lost to this country one of its ablest teachers of forestry in Dr. Fernow. It is much to be hoped that the new school will escape such pit-falls and work out a career of great usefulness.

NATIONAL FOREST WORK

An Official Account of the San Bernardino Fire

In view of the many conflicting newspaper reports on the recent San Bernardino fire, District Forester Coert DuBois, who is in general charge of the national forests in California, has issued the following authentic account:

The fire started about noon on Tuesday, July 25, from an unknown cause, on the west side of the road up Waterman Canyon. Within an hour and a half, three forest rangers and seven citizens had reached the ground and brought the original fire under control with less than two and a half acres burned over. A separate fire, starting from a brand, blown from the main fire, had also been detected and extinguished. Another spark had evidently jumped across the road from the original fire when it was burning its hardest. This spark smoldered but did not show up in flame or smoke until some fifteen minutes after the first two fires had been brought under perfect control. The ten men on the ground attacked this third fire promptly and except for the high wind then blowing, they would have had no difficulty in conquering it.

Cases are very rare where fires escape from control after being reached by the rangers as promptly as this San Bernardino fire. When the rangers and fire fighters had this third fire almost under control, a furious gust of wind came up the canyon, scattered fire all over the hillside from the one-half acre, then burning, and forced the men to run for their lives. Except for this extraordinary wind, which eye witnesses say was a small hurricane, the fire would never have escaped and would have represented little more than a figure in annual fire reports and other statistics.

After the fire escaped, it burned with uncontrollable force during the remainder of the afternoon and covered over 500 acres by 6 o'clock Tuesday evening. Realizing that help was needed immediately, the ranger in charge when the fire escaped promptly telephoned to San Bernardino for men. Right here the protection system broke down. Naturally no forest officer was in San Bernardino and no arrangements had been made in advance for the immediate dispatch of volunteer fire fighters or organized bodies of men in case of fire. The men telephoned for by the ranger were not

sent. The small force of men on the ground fought without help twenty-one hours, or until 11 o'clock on Wednesday, July 26. Recognizing the hopelessness of the situation, two rangers then left the fire line and went to San Bernardino for men. The opportunity to conquer the fire had, however, been lost for lack of help during the first twenty-four hours. During the second and third days of the fire rangers and fire fighters labored unceasingly to control the blaze. They succeeded except in the head of a fork of Cold Water Canyon where the fire was burning fiercely on very steep ground covered with a dense growth of manzanita and thorn brush and where there was very little dirt to use in fighting the flames. Forest officers and fire fighters who have been over this ground report that the difficulties confronting the fire fighters at this point cannot be understood by anyone who has not actually been over the ground. Friday night, when the fire had been burning for a trifle over three days, a fire line was almost completed around the lower end and sides of the fire. Before the circle could be closed, a high north wind started to blow and scattered fire in new directions, undoing much that had been gained during the previous day's fight. The north wind blew for only two hours, but in this time fire was so scattered that when the normal southwest wind again started up, the fire was able to spread rapidly, despite the desperate efforts of the hundreds of men then on the line. North winds blew again at intervals during Saturday night, Sunday and Sunday night. Each time the north wind blew, the fire was blown backward into positions from which, when the southwest winds returned, it could make uncontrollable rushes up the steep front of the San Bernardino range. By Sunday night the fire had spread to such size that the task of working the enormous length of the fire line was not completed until Monday, August 7, almost two weeks after the fire started.

When the fire started, Mr. R. H. Charlton, the supervisor of the Angeles National Forest, was on one of his regular trips of inspection and field supervision. He promptly got in touch with his subordinates who were in charge of the fight, but since they repeatedly reported that they expected no difficulty in conquering the fire, Mr. Charlton did not leave his regular work for

several days. Deputy Supervisor Long was in Los Angeles in charge of the supervisor's office when the fire occurred. When the fire had been burning twenty-eight hours he realized that the situation was grave enough to demand his personal attention and immediately started for San Bernardino to take personal charge of the work.

The organization of the fight at this fire was about the same as usually effected when large stubborn fires are being fought. On occasions of this kind, red tape is never a bar to prompt and effective action. At this fire men were employed, supplies purchased, and every sort of transportation arranged for both men and supplies without the delay of any system of requisitions or approval of higher officers of the service. The standing instructions to supervisors and rangers are to incur any liabilities necessary for the controlling of any fire on national forest lands. At no time in the history of the San Bernardino fire was there any hesitation in securing men or supplies because of the expense or lack of authority of men on the ground to incur it.

A peculiar feature of this fire was the opportunity to use automobiles in transporting men and equipment. This very successful mode of transportation was used wherever necessary. The camps were kept well supplied with provisions and men went hungry only when they were unable to get to the camps.

Although no preparations had been made for the employment of such large bodies of men, numerous ingenious systems of organizing small crews, issuing and dispatching orders and handling men at camps were devised and adopted, notwithstanding the strain of the fight.

Men were employed at the standard rate of pay for this part of the country. Twenty-five cents per hour was allowed for time consumed going from San Bernardino to the fire, for all time spent on the fire line or in traveling between the fire camps and the fire line, and also for returning from the fire to San Bernardino. The statement that straight time was allowed at 25 cents per hour from the start from San Bernardino until the return was unauthorized and did not originate with any forest officer. It is obvious that the standard forest service system of paying fire fighters by the hour would be nonsensical if payment were to be made for twenty-four hours a day.

Back-firing, when possible to practice it, is one of the most effective methods for fighting forest fires. This system was used whenever conditions of wind and slope made it safe, and miles of back-fires were set under the instructions of forest officers. Back-fires are exceedingly dangerous weapons, however, and when indiscriminately or unintelligently used, are certain to spread the fire instead of aiding in its control. One of the most serious handicaps the forest off-

icers had to contend with was the setting of unauthorized back-fires by settlers who wanted to protect their own property but failed to take precautions against spread of the fires they had set.

Instructions against back-firing were usually respected by settlers and threats to use fire arms were not necessary and were not at any time resorted to. Some disastrous back-fires were set when no forest officers were near to prevent it. One saw-mill man back-fired around his property although he was not in the path of the main fire. He then started up his mill in disregard of possible damage his back-fire might do to others. Forest officers and fire fighters had to leave their work on the main fire to fight this back-fire but before they succeeded in bringing it under control it had, on account of the high wind prevailing at that time, run over two miles and joined the main fire.

On August 3, while the San Bernardino fire was still at its height, a disbursing agent was sent from San Francisco with a large sum of money to his credit in the United States subtreasury. He arrived in San Bernardino on the morning of August 4. Only straggling fire fighters were then in town awaiting payment and it was not until the night of August 5 that a forest officer could be spared from the line to come into town and approve the time checks of the fighters. The disbursing agent started writing checks on the morning of August 6 and kept it up until August 13, at which time he had paid all of the labor accounts except a few odd bills that had not been presented. Settlements of fire accounts in this case, as in all others, take precedence over all other bills.

The total cost of controlling the fire was in the neighborhood of \$25,000, practically all of which was paid by the forest service. The total area burned over is a trifle under 19,000 acres. Two-thirds of this area is devoid of timber but was covered with a growth of brush of very great value to the water-using industries of the San Bernardino Valley. The damage to timber is less than would be expected—not over five per cent of the mature timber and only half of the young timber between ten years of age and maturity being killed. Seedlings under ten years of age were, of course, consumed.

An investigation will be made to determine the best method of repairing the damage to the watersheds burned over, but as yet no plans have been made for planting the denuded hillsides.

At several different times, officers in charge of the fight, as well as mountaineers who have had life-long experience at the fire-fighting game, believed they were nearing the end of the fight. That their expectations of success were not realized was due to the freakish winds. The judgment

of forest officers is only human and all experienced fire fighters recognize the difficulty of contending with high winds or forecasting the outcome of efforts to control a fire when a strong wind is blowing. Every specific charge against the men in charge of the fight has been carefully investigated by an officer from the San Francisco headquarters, and they have been entirely cleared of any suspicion of inefficiency.

Supervisor Charlton and Deputy Supervisor Long have had years of experience in fighting brush fires. They have been particularly successful in keeping fires out of the forest under their charge. Last year the Angeles' record for prevention and prompt control of fire was the best in District 5, comprising California and Western Nevada.

Causes beyond the control of these men or the rangers who assisted them were alone responsible for the failure to extinguish this fire in its early stages.

As soon as it was found that there was no possibility of ordering out troops (the authority for which was requested by the district office), emergency bodies of fire fighters, each 20 to 25 strong, were assembled at Bakersfield and at Bishop and held "under arms" for two days. Luckily these were not needed, but if the need had arisen at least 100 men under the leadership of six experienced fire-fighting rangers could have been rushed to the scene from nearby forests.

The people and commercial organizations of San Bernardino, Redlands, and Riverside gave splendid cooperation in bringing this fire under control. They are entitled to the sincere thanks of the department and the people of Southern California who are benefited by the protection of the San Bernardino mountain range.

A number of valuable lessons can be learned from this fire. A study of its history indicates the need, first of all, of closer cooperation between the people of southern California and the Forest Service. If citizens and employers of labor will organize themselves into protective associations and agree in advance to send help immediately on receipt of notice that help is needed on a fire, assurance can be given that the history of the San Bernardino conflagration will not be repeated. The construction of trails, fire lines, the purchase and storing of tools and other equipment at strategic points, the employment of additional patrolmen—all these measures will help, but the appropriations made by Congress are not large enough to do everything at once that should be done. The people of southern California must cooperate even more liberally than they have in the past if fire is to be kept out of the mountain ranges.

August 26, 1911.

A Government Timber Sale and Its Conditions

The Department of Agriculture and the Department of the Interior have just concluded arrangements that will probably lead to the largest timber sale ever undertaken by the Government. The tract to be lumbered is in the eastern part of Arizona and comprises a large portion of the Sitgreaves and Apache National Forests and a part of the Fort Apache Indian Reservation. The total area to be lumbered is about 200,000 acres, and contains approximately 600,000,000 board feet of merchantable timber.

Application for this stumpage has been made by the Navajo Development Company, a corporation chartered under the laws of Arizona, and a careful examination of the area has been completed by representatives of the company and of the Forest Service and the Indian Office. This does not mean that the development company will secure the stumpage unless its bid is the highest, because, under government regulations, the timber will be sold to the highest bidder. But the fact that the company has made application warrants the placing of the material upon the market.

Nine-tenths of the timber, or approximately 575,000,000 board feet, is western yellow pine, which possesses many of the excellent qualities of the white pine of the Northwestern and Lake States. The lumber manufactured from it combines lightness with strength and easy-working qualities; the best grades are made into finishing stock, flooring and ceiling, and sashes and doors. The clear material is highly prized by pattern makers, and one manufacturer of this wood sells his entire output to a transcontinental railway line for use in making patterns in its shops.

The timber next in importance on this area is Douglas fir, of which there are 15,000,000 board feet. This wood is excellent for mine and other timbers, and some railroads pay a higher price for Douglas fir ties than for those made from other kinds of trees, because they last much longer when in contact with the ground. The rest of the merchantable material is made up of white fir, Engelmann spruce, Mexican white pine, blue spruce, and cork-bark fir.

The timber is located about 60 miles south of Holbrook, Arizona, the county seat of Navajo county, which is on the main line of the Atchison, Topeka and Santa Fe Railroad. From Holbrook a railroad can be built south to the timber, and will pass through a region where there are several small towns and much agricultural land which can be irrigated. The full cost of railroad construction will not have to come out of the investment for developing the

timber, because the road can be made a common carrier and many thousand tons of freight now handled by slow and cumbersome freight wagons could be hauled each year on the new line; also large quantities of hay, grain, and other supplies are used at Fort Apache, an important military post about twenty miles south of the tract. In addition to this, some revenue should be derived from passenger traffic, not only from civilian travel but from the movement of troops to and from Fort Apache, and there should also be a good income from mail contracts.

Deposits of coal said to be of excellent coking quality are within thirty miles of the timber, and the development of these deposits only awaits railroad transportation.

In order to secure immediate development of this timber resource and at the same time to protect the purchasers of the stumpage in their investment and give them sufficient time to make the cutting, the government has set a limit of ten years from the completion of the logging plant in which the whole 600,000,000 feet of lumber must be harvested. Two years will be allowed for the preliminary work, such as building sawmills, quarters for the lumber crews, logging railroads, and spurs.

While the Navajo Development Company makes the application for this timber, it will be advertised in the open market for 120 days, and the timber will be sold to the highest bidder in accordance with the regulations prescribed for the sale. No price will be considered less than \$2.50 per thousand board feet for the timber cut during the first five years of the contracts and \$3 for that cut during the last five years. During the first two years of the contracts, which will be separate for the national forest timber, under jurisdiction of the Forest Service of the Department of Agriculture, and the Indian Reservation timber, under the Indian Office of the Department of the Interior, the successful bidder will be required to cut 35,000,000 board feet under each contract. Each year after this, however, he will be required to cut not less than 25,000,000 board feet under each contract.

There are several special provisions of interest which provide for full utilization of all the available material: The sale includes two-thirds of the live timber and the merchantable dead timber; no unnecessary damage shall be done to the young growth nor to trees left standing for seed; stumps must be cut low and trees utilized well into the tops; brush will be disposed of by the purchaser; all felling and cutting into log lengths will be done with a saw instead of an ax, to avoid the waste in ax chips. Strict

precautions will be observed for protection against fire, and railroads and logging engines will have to use oil or electricity. The use of oil is thoroughly practicable, as it can be obtained cheaply and conveniently. The main line of the Santa Fe, only a few miles away, uses this fuel, and it is used also in lumbering operations on the neighboring national forest, the Coconino.

Altogether, this timber sale should prove an attractive proposition, since the tract contains what is probably the largest body of good timber now remaining in the Southwest. It is not in rough country, but on an extensive plateau where the ground is either smooth and level or gently undulating. The region is well watered and presents almost ideal logging conditions. Not only should it be attractive from the point of view of the lumberman but from that of persons who are interested in opening up and developing a comparatively new region. The country has needed only the railroad facilities which will be offered by the road from Holbrook south to make rapid strides. Even at the present time tens of thousands of cattle, sheep, and horses graze in the region, yet all beef and mutton must be driven on the hoof to Holbrook and wool has to be freighted by wagon from distances varying from 30 to 100 miles. In addition to the timber directly involved in this sale, other large bodies aggregating about 1,500,000,000 board feet will be made accessible by the proposed railroad.

District Forester Silcox at Missoula, Montana, has just sold a total of 125,000,000 feet of fire-killed timber, presumably a part of the timber killed in the great fires of 1910.

The Forest Service has been making energetic efforts to dispose of this fire-killed timber before it should become a total loss, and has made a number of sales but none of equal magnitude with those now announced. The sales are of 50,000,000 feet to the McGoldrick Lumber Company of Spokane, and 75,000,000 feet to the Roselake Lumber Company of Roselake, Idaho.

Ordinarily such large sales are made from Washington, with full reports on file, but in this case special authority was given to the district forester to close contracts at once. There is still a great deal of fire-killed timber in the northwest which is for sale on very reasonable terms, and as a result of field studies of its amount and the natural conditions the Forest Service is prepared to furnish full information to prospective purchasers concerning the location of bodies of timber and the logging methods which will be necessary in each case.

The Use of Odd Lengths

The investigation carried on last year by the United States Forest Service, cooperating with lumber manufacturers in the south, to determine the saving that can be effected by using odd lengths of lumber as well as even, has begun to bear fruit. That investigation showed that a material saving was practicable, and at a recent meeting of a southern lumber manufacturers' association the fact was brought out that a beginning has been made in putting the new plan into practice, and that an increase in the sale of odd lengths is anticipated for the near future.

It was formerly the custom, and generally is so still, to sell lumber in even lengths only. Waste resulted from cutting off the ends of odd lengths to make them even. A considerable percentage of the boards in a sawmill's output have knots, decayed spots, or split ends, and the defective parts are cut out. To make an even

length of what remains, it is often necessary to cut off a foot of good wood with the bad, and it is wasted. The practice of marketing odd lengths as well as even is meant to lessen this waste. The sale of odd lengths of lumber will frequently lessen waste in the woods also; for example, a log may be cut fifteen feet long which, following the old custom, would be cut only fourteen and the extra foot left in the woods.

The introduction of odd lengths meets with opposition from many builders who are prejudiced in favor of even lengths simply because they have never used any other kind. Nevertheless, there are many places in which odd lengths are more economical than even ones—for instance, where nine-foot studding is used. Following former custom, the ends must be cut from even lengths to make the timbers fit. Some manufacturers of flooring successfully sell odd and even lengths, thus lessening waste in the woods, at the mill, and in the construction of buildings.

CURRENT LITERATURE

REVIEWS

The Principles of Scientific Management.

By Frederick Winslow Taylor, M. E., Sc. D., past president of the American Society of Mechanical Engineers. New York and London: Harper and Brothers, 1911. Pp. 144. Price \$1.50 net.

For thirty years Mr. Taylor has been developing the theory and practice of more perfect utilization of human effort. This book sets forth the underlying principles at which he has arrived. We do not need to go into the controversy in which some of the labor unions have enrolled themselves in opposition to something which they have apparently taken too little pains to understand. Nor do we need to accept the extravagant claim, resting upon a misuse of terms, that here is the birth of a new science. What is worth noting is whether the author has any valuable ideas for the promotion of human efficiency and for doing away with much of the wasted energy and lost motion that every intelligent person knows there is in both the physical and intellectual activities of most of us. Looking at it thus, Mr. Taylor's thesis is worth careful study. It is intended presumably for the organizer and director of industry, but it may be suggestive to every worker. Scientific management will now be much in evidence before the country, in theory at least, and it behooves every one to understand its real significance. It certainly does not mean, as some have hastily as-

sumed, making men work harder. It does mean, we take it, making men work better and hence more easily. If anything will lead to shorter hours and better pay, looking at it from the labor side, this should be the touchstone. In any aspect of the case, the leader of the new movement is entitled to his demonstration.

The Better Country. By Dana W. Bartlett. Boston: The C. M. Clark Publishing Company, 1911. Pp. 555. Price \$1.50 net.

The chief value of this book is as encouragement to optimists. It is a rapid fire summary, reading almost like a catalogue, of the many things that are being done for the physical, mental and moral benefit of the people. As such it is a good antidote to the disheartening destructive criticism with which various publications have teemed for a few years. It treats of social service, raising the standard, nations at work in social uplift, wealth for all the people, conservation of the nation's resources, agriculture's opportunity, home building, enrichment of life, life saving, education, immigration, serving others, the peace movement, and the broadening of democracy. This is a wide field, covering all the great progressive activities of the people and it is almost unavoidable that such a summary should be too much of a catalogue and contain too little of the significant and useful facts about the movements to which it refers. It is a book of temporary interest and will serve to give

the reader a conspectus of the intensely active period in which we live, but it is not of permanent value and will add very little to the information of the man or woman who reads much and follows closely the course of events.

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NEWS AND NOTES.

Lost River in New Hampshire

The Society for the Protection of New Hampshire Forests, having aided in the preservation of the top of Sunapee Mountain in that state, of which it is to receive the title from the public-spirited purchasers, is now endeavoring to preserve another of the scenic treasures of New Hampshire, the gorge of Lost River, lying in the wildly picturesque country between Mounts Moosilauke and Kinsman.

Lost River, rising on the slopes of Mount Moosilauke, runs for a mile and a half over steep cascades, then plunges underground for nearly a mile before emerging to the surface again. In its subterranean course are many large caverns and cascades. Kinsman Notch, through which the river runs, is notable for its steep wooded cliffs, the beaver meadows at the summit of the notch, and its numerous streams.

The society has voted to apply to this purpose a recent legacy of \$5,000 and is trying to raise by subscription the remaining \$2,000 for the purchase and \$1,000 additional to be used to clear up the slash and waste timber left by lumbermen in previous years.

The Publishers' Paper Company, which owns the property, has agreed to give the society title to 148 acres, including the whole underground route of the Lost River, provided the society will pay \$7,000 for the standing timber.

The Southern Pine Beetle

Professor A. D. Hopkins, of the Bureau of Entomology, has made a report upon the dying of pine timber in parts of Georgia, South Carolina, and North Carolina. He finds this due to the work of the southern pine beetle, which was found to be thriving in the bark of all the infested trees, the indications being that the beetle exists in enormous numbers. The report continues:

It has been known for more than forty years that this particular beetle has existed in the southern states, and our extensive studies of it within recent years indicate that it has occupied the region since time immemorial. It appears, however, that only at long intervals does it increase to such numbers as to cause widespread

depredations, such as, for example, the great invasion of 1890-1893 in the Virginias. Under the normal conditions of its life and habits, a few scattering trees are killed by it each year in nearly every county throughout the southern states where the pine is common. If, however, there are from any cause favorable conditions for the multiplication of the insect, it is thus able to kill groups of trees, and if these groups increase in number and size the following year, they constitute the danger signal of an outbreak with resulting widespread depredations. These are just the conditions found in the localities observed, and from the reports received from different sections of the South ranging from Texas to Virginia, it is evident that they prevail throughout the greater part of at least the short-leaf pine belt. Therefore, there is every reason to believe that unless prompt and properly directed action is taken by owners of pine timber throughout the region during the coming winter, a large percentage of the best old as well as middle aged and young pine will be killed within the next two or three years.

Published information, as well as special instructions on practical methods of control, have been sent to all of our correspondents who have requested advice on the subject during the past year. Doubtless in some cases the advice as to proper methods of combating the pest has been followed, but in every case examined where some attempt had been made by the owner towards control, little or nothing had been accomplished from the fact that some of the essential details had been neglected. In most cases the dead trees had been cut after the beetles had left them and in other cases the bark from the dying infested trees had not been destroyed in time to prevent the escape of the broods of beetles. Therefore, it is evident that in order to bring about the proper general understanding and application of the most economical and effective methods of control and protection, it is necessary for the experts of this bureau to conduct some practical demonstrations in different sections of the South. With this object in view, the bureau will establish a forest insect field station at some central point in the South, where instructions can be given and where

agents and experts will be available for demonstration work.

In the meantime, every one who is interested in the protection of the pine timber land, and the prevention of the widespread destruction of the pine throughout the country should report to this bureau the location of every large patch of dying or red-topped dead timber observed between now and the first of next February.

The time to conduct the real work of control will be between the 1st of November, 1911, and the 1st of March, 1912, and concerted action in carrying out the most economical and effective methods in the affected areas in each county of the several states involved is essential to success.

The methods of control will vary somewhat in different localities and sections of the region, but briefly they are as follows:

a. The location of dying trees actually in-

festated with the broods of the destructive insects.

b. The destruction of the broods in the bark of the main trunks of the trees. This is accomplished in many different ways, and whenever the wood can be utilized for cordwood, lumber, or other commercial purposes, the value of the product will balance the costs of treatment, and in some cases yield a profit, but to avoid serious mistakes one must know how and be sure he is right before he makes the attempt.

The advice of the experts of the bureau of entomology, United States Department of Agriculture, can be had for the asking, and personal instructions will be given and demonstrations made in sections of the several states where the greatest interest is manifested and where the best facilities are offered for rendering the service to a large number of owners.



E d u c a t i o n
C o ö p e r a t i o n
O r g a n i z a t i o n



FIRE GUARD'S HOUSE, GANLEY RIVER HEAD-
QUARTERS



BEST PART OF TIMBER DESTROYED BY RE-
PEATED GROUND FIRES

FIRE PROTECTION IN SOUTHERN
APPALACHIANS

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A FIRE PROTECTION PLAN IN THE SOUTHERN APPALACHIANS

By W. H. WEBER.

THE Cherry River Boom and Lumber Company is the owner of some 50,000 acres of timberland in West Virginia. This tract is located in Webster, Pocahontas and Greenbriar Counties and includes the entire watersheds of the Cherry, Cranberry and Williams Rivers and the headwaters of the Gauley.

This region is very mountainous, the only level country being narrow flats found occasionally along the river bottoms. To describe it more graphically it is, so to speak, all up and down, since ridge after ridge rises abruptly from the narrow stream valleys to terminate in narrow rocky crests over 4,000 feet above sea level. Thus the country is naturally divided into districts bounded by water courses and high ridges which are natural fire lines.

These mountains and valleys are covered with a rich virgin forest which changes in its character according to the elevation. At 1,800 and 2,000 feet in the valleys we find mixed hardwoods, such as the oaks, maples, beech, cherry, yellow poplar, ash, etc., growing luxuriantly. Farther up on the ridges hemlock appears in mixture with them. At the 3,500 foot line red spruce is occasionally found which increases in numbers as we go upward, until at 3,800 feet it becomes the dominant or most frequent tree, topping the ridges as a rule with a heavy spruce forest.

Again, the climate is excellent as the mountain ranges are strong factors in precipitating moisture from passing cloud banks so that showers are frequent, especially in summer, and there are rarely any long periods of drought. The exception to this occurs in the spring and fall. At these seasons the leaves are off the trees, allowing the sunlight to reach the forest floor. This condition tends to dry up the leaf litter rapidly, so that after two or three days of fair weather the fallen leaves become very inflammable and form a real fire danger.

It is at these two seasons of the year that practically all of the forest fires occur, hence the opinion that these seasons are particularly dry, although in reality they may not be remarkably so. An indication of this lies in the fact that in certain instances small fires are extinguished by rain before they have been able to do any wide damage.

This brief introduction enables us to understand better what is said in the following pages, since the character of the forest, ruggedness of the country, and climatic conditions determine the methods of fire protection.

It is gratifying to mention at this point that this company is desirous, for many reasons, of conserving its forest resources. In the summer of 1909 the writer made a report upon the forest conditions of the company's lands. He found upon the cut-over lands that most species of trees, and particularly the more valuable spruce returned very rapidly, and that spruce, even before the present operation was completed, would undoubtedly be of sufficient size and in large enough quantities to be of commercial value.

The question then arose as to the best method of securing this second cutting. There were minor considerations which go beyond the scope of this article, but it was pointed out that the principal factor in securing any future return of timber would be a thorough plan of fire protection. Unless the young growth was to be protected, nothing could be produced at all. This applied to the cut-over lands, but beyond these lands there was a certain amount of damage created by surface or ground fires each year on the timberland not yet reached by the lumbermen. In the spring and fall fires were frequent throughout the hills, running for days through the undergrowth and around the bases of the timber trees until finally extinguished by rain. It was easily seen that although no one fire of this kind would kill the larger trees outright, the frequent burning charred and hollowed out the bases of the trees, eventually resulting in a high percentage of damage to the butt logs and also formed a good place of entrance for fungous diseases and for timber damaging insects. Hunters, fishermen and others were usually responsible for these fires, and they did further damage by peeling the bark from hemlock and spruce for use in making rude roofs and siding for temporary camps.

For these reasons a plan of fire protection to cover the uncut forest as well as the cut-over territory was determined upon. The work of perfecting this plan was gradual, one feature after another being put in operation until in the fall of 1910 the system was undertaken as a unit.

It is a difficult thing to place before a reader even though he be interested in the subject, a readable statement of the machinery of a plan of this sort. There are numerous details of equipment, of duties, and routes of patrol, that must necessarily be changed for each district. We will in this paper, mercifully omit these details, following the general subject along its main lines of procedure, in the hope that they may contain features of interest. Like the darky preacher who stated to his congregation that his sermon was divided into three parts, "de world, de flesh and de debbil, but de subjec am so large, bredderen, dat for de start off we will omit the world and de flesh an' go straight to de debbil."

Briefly stated then, the territory was divided into three divisions:

- (1) The cut-over areas and the timbered lands.
- (2) The railroads.
- (3) The areas where contractors are cutting timber.

These three divisions were put in charge of a fire chief, who was responsible for all fire damage in the entire region. The woods-foreman was selected for the position since he had charge of most matters pertaining to the woodland. When the methods to be used were explained to him, he expressed himself as heartily in favor of them, and has proven well fitted to the position. The fire chief was provided with an assistant whose duty it is to keep the chief informed constantly as to the efficiency of the men and equipment. He delivers orders from the chief and supplements him in many ways.

THE CUT-OVER AREAS AND THE TIMBERED LANDS.

It was considered best to protect these areas by establishing a patrol. The patrol men or fire guards, as they are called, were selected for their fidelity, and their knowledge of the region over which they were given charge. Their duty required them to watch over a definite area of land, and to do this, each man was given a route over which he was required to travel, making a complete circuit to his starting point every four days. The patrol continued during the dry seasons of spring and fall and in hunting and fishing seasons. The routes also changed from the ridges to the stream beds at different seasons. The ridges being more carefully watched in the hunting season, and the streams while the fishing season was open. In conjunction with this the company continued a custom originated many years ago, of requiring each fisherman or hunter to secure a permit to hunt and fish, agreeing therein to assist in every way possible to prevent fire and to report any persons peeling or otherwise destroying timber. The patrols, upon meeting a hunter or fisherman requested him to show his permit and impressed upon him the necessity of careful tending of his own camp fires. Often a patrol was allowed to secure a permit for persons found trespassing without one, and in this way established friendly relations with all campers, and secured their co-operation.

Unfortunately the state legislature of West Virginia passed a law in the spring of 1911 allowing all persons the right to trespass at will upon all unfenced lands within the state. This law vitiates the permits and likewise makes it impossible for the company to inform itself as to how many campers are on the land or where they may be located.

In addition to watching the fishermen and hunters the fire guards co-operate with any settlers in their district and arrange to be present when brush is to be burned or a clearing of any sort made. They also post notices along trails and in conspicuous places to warn all against starting fire. Along the routes of the patrolmen there are shelters at different points where they may stay when storms overtake them or pass the night while making their rounds. At the three forks of the Williams River the company has built a house where one guard and his assistant are located permanently the year round.

At the headquarters of the Gauley another patrol has his house, and on the Cranberry River the patrol uses three or four different hunters' cabins and has his home beyond the company land. A telephone line is being constructed to the house on the Williams, which in case of fire will save much time in summoning aid, since this line will reach most of the settlers in the region. Another line may be carried up the Gauley in the same manner.

The patrol system has been in operation for over a year and has proven very efficient thus far, there having been no damage to timber in any district, with the exception of two small brush fires on the Williams and one on the Gauley. These were all located within a short time and extinguished before any damage had been done to standing timber.

The manner in which these fires were fought illustrates fully the fire guard system. On the eleventh of May, 1911, the guard on the Williams saw smoke rising above the trees two miles or so below his house. He immediately sent out his boy to get a couple of settlers further up the valley and set out for the fire himself. Within a couple of hours he had been reinforced by these men, and they surrounded the edge of the fire with a narrow fire line made by hacking out the undergrowth down to the rocks and then beating out the fire with shovels and throwing dirt on it when it reached the line. They had just controlled the fire when over the ridge came the fire guard from the Gauley district with eleven men. They had seen the smoke and

came to help. With this large force the fire was promptly extinguished and a man left for the night to see that it did not break out afresh.

A forester inspects the patrols at intervals during the season to suggest methods of gradually increasing their efficiency. It was on one of these trips of inspection that the writer remarked to the patrol, "Say, Jim, didn't you ever get lost in these mountains? Of course, I know that you understand them mighty well, following up the fishers and hunters, but it seems to me that even the best of men would get lost once in a while in this tangle of hills and valleys." He paused for a second, "No," he said at last, "I ain't never been what you might call lost, but worst about five year ago, up thar on the headwaters of Cranberry, I was plumb confounded for as much as three days."

THE RAILROADS.

Coming to the second division, that of the railroads, we should first state that the company has over 75 miles of standard gauge railway lines upon the property and operates sixteen engines to haul its log, bark and pulp trains. The division of railroads is in charge of the railroad boss. It is his duty to see that the fire protection equipment is provided and operating, to inform the fire chief of any fires reported to the central office, and to send out special crews to fight fire whenever necessary. Under the railroad boss are the engineers and trainmen whose duties require them to stop and extinguish any small fires along the right of way, or to cut off and go to the nearest company camp to bring men to fight fire, at the same time notifying the fire chief through the central office.

Beyond the operating department is the track department, or section crews. They keep the track clear of inflammable material for twenty feet on either side of the right of way. They fight fire wherever found in their section, and in very dry weather patrol the track after every train, one man going to the end of his section and relaying another man from the section crew beyond.

As to equipment, every engine has a spark arrester which is regularly inspected and kept in good condition. Also fifty feet of hose with a nozzle is kept in a box on the tender. Hoes and pails are located in the section houses, and every patrol carries a pail. This fall a hand pump will be added to the equipment to make fighting fire with buckets more effective.

Along the right of way, wherever it departs from streams that have a constant flow through dry weather, water barrels are placed. The intervals between these barrels vary with the grade, and they are kept constantly full for use in emergency. There are also tank cars, which can be hauled to a fire to supply the hose line on the engine.

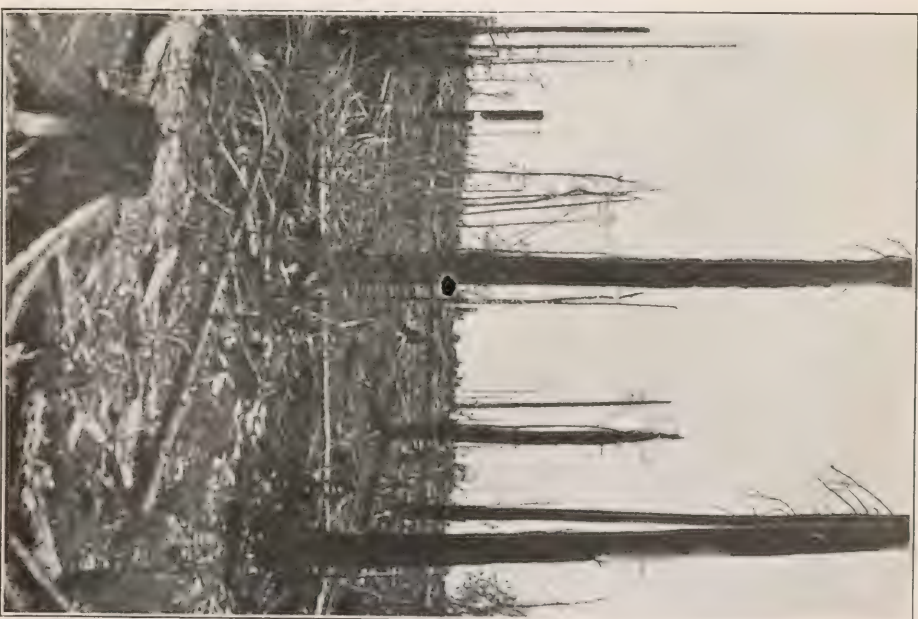
It is undoubtedly a fact that the railroad engines are the greatest fire menace. First, because they are constantly in every part of the timber operation, and second, because of the difficulty of preventing the throwing of sparks when on heavy grades. The spark arresters frequently get out of order and an engine will often travel a whole day before a broken arrester is discovered.

On a steep grade with a heavy load a fireman can easily imagine that the engine groans piteously to be released from its muzzle, and occasionally upon inspecting a bad break in the wire mesh of the arrester a clean hole will be found very similar to one which might be made by a vigorous thrust of the fireman's poker handle.

The organization has been in effect on the railroad during the last nine months, and in that time one large fire, covering almost a thousand acres, was set by an engine with a defective arrester. Fortunately the area burned had



FIRE STARTED BY FISHERMAN'S CAMP UNDER AN
OLD SPLASH DAM



FIRE PROTECTION IN SOUTHERN
APPALACHIANS

CUT OVER AREA BURNED IN SPRING OF 1911,
SHOWING OLD STUBS THAT ACT AS FIRE
BRANDS



SPRUCE PEELED BY CAMPERS AND BARK USED TO
MAKE SHELTER



LINE MADE BY CUTTING FIRE LANE. FIRE
CHECKED HERE FROM ENTERING STANDING
TIMBER

FIRE PROTECTION IN SOUTHERN APPALACHIANS



A BRUSH FIRE ON WILLIAMS RIVER WAS CHECKED
AND EXTINGUISHED IN THIS THICKET BY
TRENCHING AND BACK-FIRING. MAY, 1911



A FIRE TRAP—BRUSH AND SLASH ALONG RAIL-
ROAD

FIRE PROTECTION IN SOUTHERN APPALACHIANS



FOREST RANGERS SOWING YELLOW PINE SEED
FROM HORSEBACK NEAR PUMA CITY, COLO-
RADO

been recently cut over and no damage to merchantable timber resulted. As it was, as many as ninety men were engaged some time in fighting it, and if it had not been discovered promptly by a patrolman and fought vigorously, a heavy loss of merchantable timber would have resulted.

The section crews were of valuable assistance during the dry period, and many minor blazes, only a few yards in diameter, were extinguished by the prompt arrival of some track walker—usually the section foreman himself—who followed up the passing trains.

The fire chief has been so vigilant that at one particular dry period of two weeks he suspended the running of log trains except in the early morning and at night—times of the day when fires are least likely to be started.

THE AREAS WHERE CONTRACTORS ARE CUTTING TIMBER.

The intermediate district not covered by the railroad or patrol is that area in process of being lumbered. The contractor or boss of the company camps is responsible for this area. There is a clause written into his contract fixing on him the responsibility for any fire damage in the district under his care, and a notice is tacked to his shanty so that all his men may see it. This informs him that for any logs burned he will not only lose the scale or tally of the logs, but in addition, he will be charged with the value of the logs thus destroyed.

At different seasons of the year there is a real danger where contractors are burning brush along the railroad to get an open place for what they call a "landing" or place to stack up the logs. A careless man will sometimes leave a brush fire while he goes off to his dinner, or trust to luck that all will be well if he allows it to burn all night. More or less fixed habits of this sort are not easily overcome, but during the nine months that the regulations have been in force no fires have resulted. This has undoubtedly been due to increased vigilance upon their part and to suggestions from passing fire guards or the assistant fire chief who inspects their cuttings from time to time.

To increase the efficiency of the three divisions described above, a forester visits the property at intervals. Written reports are turned in to the fire chief from the patrols once each month and these are kept on file for the use of the forester who goes over them carefully to note the results of each district.

The forester receives verbal reports from the railroad department and traces to its cause any fire that may be reported to the office, and wherever possible extra preventive measures are taken that a similar fire may be handled to better advantage. To illustrate this, it has been found that small hand pumps are of great assistance to track walkers in fighting small fires, and these will, in future, be added to the pails which the men now carry.

It can also be seen that as more timber is cut and new railway lines projected into the uncut forest, slight changes must be made in the different patrol districts. The forester provides for these as the operation progresses so that each division is protected. It is also planned to make minor changes from time to time in all the divisions as quickly as the men become most efficient in the duties now assigned to them. This is in accord with the plan of gradually making the plan more intensive in its efficiency.

To sum up the results of a year's trial of the plan we must take into consideration the region as a whole. It has been everywhere a season of unusual drought, and large fire losses have been sustained by neighboring lumber companies. One company has lost much standing timber as well as logs, log cars, and a railroad bridge. Another company had fire sweep through its

standing timber and through a part of the lumber town, burning several houses. In fact, the month of May was so very dry that wherever there were railroads, fires were sure to occur, and would spread with remarkable speed through the dry underbrush becoming almost at once dangerous top fires. On the Cherry River property there have been three small brush fires of some thirty acres apiece, one large fire in recently cut over lands along the railroad, and in addition a fire not previously mentioned which started from a farmer's clearing and burned into the region of the so-called railroad fire, joining it and making the total area about one thousand acres, but none of it standing timber.

In an ordinary season such fire damage would be considered large, but under the circumstances the company, so far as they have expressed themselves, consider the results obtained a success, and their losses low.

REFORESTATION ON THE PIKE NATIONAL FOREST

By C. W. FITZGERALD

FOREST SUPERVISOR

AT NO previous time since the creation of the national forests has the work of reforesting the vast areas denuded by fire and wasteful cutting been so vigorously pushed as in the past two years. There are many reasons for this; the chief one being that before this the work of reforestation was largely experimental; and it might be said that much is still to be learned. However, sufficient progress has been made with the experimental work to enable the officer of the Forest Service to accomplish beneficial results in this all-important work.

Although reforestation is being largely practiced on the greater number of national forests, the writer will deal only with the work on the forest with which he is best acquainted, the Pike National Forest of Colorado. The lands within this forest should be covered with a "protection forest," valuable primarily as a conservator of water rather than for lumber.

The location of the Pike National Forest makes it of considerable importance to the citizens of Denver, Colorado Springs, Boulder, Manitou, and the numerous other settlements in the immediate vicinity, since the watersheds that supply these communities are located within the boundaries of this forest. Realizing this fact, the forest officers, whose duty it is to administer this area, are using their utmost endeavors to better the unfortunate conditions which exist on this important area by reforesting the watersheds of these growing cities. A large proportion of the watershed has been stripped of its timber by fire or cutting, or both. Generally speaking, two methods of accomplishing the desired results have been adopted, by transplanting seedlings which are raised at the nurseries maintained by the Forest Service in the vicinity and by sowing the seed of the trees common to the area which it is desired to reforest.

After a number of localities within the Pike National Forest had been experimented with, to determine the most suitable location for a nursery, in which to raise seedlings for field planting, a small area was selected about two miles west of the town of Monument. Monument is a small settlement on the railroad between Denver and Colorado Springs, about 55 miles south of

Denver and twenty miles north of Colorado Springs. After the seedlings which are raised at the Monument nursery have attained a suitable age and degree of hardiness, they are shipped to various localities within the forest. These localities are known as plantations. The most important of these plantations are as follows: The Bear Creek Plantation (1906); the Bear Creek Plantation (1910); the Pike's Peak Plantation (1910); the Bear Creek Plantation (1911), and the Cascade Plantation (1911).

The Bear Creek Plantation, 1906, 1910, 1911, consists of some 54 acres of land, located six and one-quarter miles south and west from the city of Colorado Springs, in Bear Creek Valley, and one-quarter of a mile above the point where the famous "High Drive" enters this valley from the south. Plantings were made by the Forest Service in 1906, 1910, and 1911. In 1906, some 4,000 Douglas fir seedlings, three years old, which had been raised at the Forest Service nursery located at Halsey, Nebraska, were planted on the western end of this area. This work demonstrated very clearly that in order to get good results on these slopes great care should be exercised in placing the plant in such a position that the slide caused by wind, rain, and snow would not bury the small seedlings, which in this case protruded only four inches above the surface of the ground. Notwithstanding the fact that some of these small plants were almost entirely covered by sand and gravel, it is interesting to note that upon being uncovered, they show a growth for each year since the date of planting in 1906.

In the spring of 1910, some 27,000 yellow pine seedlings, and 3,200 Douglas fir seedlings were planted on an adjacent area. All of this latter stock of seedlings was raised at the Monument nursery, and was planted on steep, gravelly slopes, similar to the large areas on which it is intended to continue this work. The seedlings were set out about five feet apart, where possible. Nearly all of these plants were set in a hole grubbed out with a mattock. It was aimed to set the plant as near as possible to the outer edge of the small shelf caused by this excavation in order to protect it from the slide of earth and gravel.

The results of this work were very gratifying, for a recent examination found at least seventy per cent of the plants in good condition. The yellow pine seedlings did remarkably well, having made a growth during the past year of at least six inches in every case noted. The thirty per cent loss was due to various causes, the principal ones being failure on the part of the laborers to spread the delicate root system of the seedlings into a natural position, and the work of deer or rodents which destroyed the young seedlings by cutting them off close to the ground.

Work was again taken up on this plantation during the spring of 1911, when 35,000 yellow pine transplants were set out. These plants were raised at the Monument Nursery; they were four years old, and averaged, including the roots, twenty-six inches, of which fifteen inches were above the ground.

During the fall of 1910, some 5,000 plants were set out on the Pike's Peak plantation, which is located on the northeastern slope of Pike's Peak, about one mile west of the Halfway House, a station on the Pike's Peak cog road. The elevation of this plantation is 9,500 feet. Six species of coniferous trees, common to this elevation and its rigorous conditions, were included in the 5,000 plants, which were set out October 18, and an examination of the area on November 12 showed that the yellow pine had made a growth of one inch. Since the six different species in this plantation were planted at the same time, it can readily be seen that very good reasons can be had as to which of the six is best adapted to this particular locality.

Work is now in progress on the Cascade Plantation (1911), the latest

established within this forest. When experiments were being conducted to determine a suitable locality for a nursery, a small area was selected in Jones Park, about three miles above the Bear Creek plantation, in Bear Creek Valley. All of the stock raised in this nursery had been removed to the Monument Nursery and to other localities except about 20,000 three-year-old Douglas fir seedlings of which 15,000 were recently removed from this abandoned nursery to the Cascade plantation, which is on the north fork of Cascade Creek, three miles west of Cascade, a summer resort, ten miles west of Colorado Springs on the Colorado Midland Railway. This plantation is located at an elevation of 9,000 feet, with an average slope of about thirty degrees and a north and northeast exposure. The 15,000 Douglas fir seedlings should do well on this area, as the stand of timber which formerly covered these slopes was of this species. In addition to the plants which were raised in the abandoned nursery formerly located in Jones Park, 15,000 four-year-old Douglas fir seedlings from the Monument nursery are being planted on this important watershed. These plants are particularly fine-looking and sturdy, and it is believed they will make a rapid and successful growth.

The old Pike's Peak State Road from Cascade to the summit of Pike's Peak, forms the northern boundary of this plantation. The land to the westward of this road having an easy slope with a southern exposure is well adapted to the planting of yellow pine. This slope has been selected as a suitable area to determine whether it will not be practical to plant two-year-old yellow pines from the nursery instead of three or four-year-old plants. Five hundred of these plants will be set out before May 10. If this experiment proves that this plan is feasible, it can be readily seen that a considerable expense will be saved in the production of these seedlings. Altogether 104,700 plants of different species have been planted on the Pike National Forest, covering an area of approximately 78 acres.

In addition to this, areas aggregating 46 acres have been planted in the vicinity of Clyde and Palmer Lake, 108,000 plants having been set out during 1905, 1907, 1908, and 1909. The larger part of these areas is located in Limbaugh Canyon, a short distance south of Palmer Lake. This work was largely experimental and served as a means of perfecting the system of raising and transplanting seedlings.

The yearly output of the Monument nursery is 500,000 plants, and as many as this should be set out each year upon the watersheds within the Pike National Forest. Great progress has been made in nursery practice during the past two years and the efficiency in handling the plants in the nursery, as well as in the field, has been increased one hundred per cent. Only last year it was considered that a field planter did a good eight-hour day's work if he planted 250 seedlings. During the month of April, 1911, a gang of six planters, working on the Cascade plantation, averaged five hundred plants per day per man.

While the men of the Pike National Forest are very well pleased with the results of their efforts toward reforestation through field planting during the past two years, they have tried another method, that of sowing the seed of the coniferous trees adapted to the locality which it is desired to reforest.

A large number of experiments along this line have been made during the past few years. Most of these experiments were conducted on a small scale, until the spring of 1910, when some 275 acres of denuded lands on the Denver watersheds were sown with 507 pounds of Douglas fir seed. This area is located on Trail Creek, just west of the old settlement of Pemberton, which is some twenty-five miles south of South Platte station. Trail Creek is a



FOREST RANGERS SOWING SEED ON THE SNOW
NEAR PUMA CITY, COLORADO



FOREST RANGERS SOWING YELLOW PINE SEED ON
DENVER WATERSHED DURING A SNOW STORM



AN EXPERT PLANTING A FOUR-
YEAR-OLD YELLOW PINE ON THE
BEAR CREEK PLANTATION, TEN
MILES SOUTHWEST OF COLORADO
SPRINGS



REFORESTATION ON PIKE
NATIONAL FOREST

PLANTING FOUR-YEAR-OLD YELLOW PINE ON
BEAR CREEK PLANTATION, 1911

tributary of the South Fork of the South Platte River, and the lands adjacent thereto are necessarily a part of the watershed of the city of Denver.

The seed used in this work was gathered by the men on several national forests in the state of Colorado. While results cannot be fully reported as yet, it is believed that they will be fairly good.

Of the various methods used in sowing the seed on this area, what is known as the drill or furrow method has given the best results. A furrow is made along the contour of the slope with a hoe-like instrument specially constructed for this purpose. By dragging it along the ground, a furrow is made several inches deep. A planter with a bag of seed and a rake follows the man with the furrow maker, and drops seed into the furrow at intervals of about one inch and then rakes the soil over the seed.

During the fall of 1910, an area comprising some 144 acres on the north-eastern slope of Pike's Peak, near the Halfway House, on the Pike's Peak cog road, was sown to Engelmann spruce, Douglas fir, and yellow pine seed, various methods being employed. Owing to the lateness of the season when this work was done, results cannot be accurately given as yet.

During the winter of 1910-1911, the officers of this forest were informed that it was the desire of the district forester that extensive experimental work be done along the line of sowing yellow pine seed on the snow, especially on the watersheds. Some 3,600 pounds of yellow pine seed, which had been gathered by the men of the national forests in Colorado, Wyoming, and South Dakota, were allotted for this work, and an expert was sent out to make a reconnaissance and select suitable acres on which to do the sowing. During the month of February, 1,150 acres of land were sown to this yellow pine seed in different parts of the forest. About 900 acres of the total area are located on the watersheds of the North and South Forks of the South Platte River, from which the city of Denver obtains its water supply. The remainder of the sowing area is located on the watershed of Fountain Creek, from which a part of the domestic and municipal supply of Colorado Springs is obtained.

It was considered that the most favorable time to sow this seed was during a snow storm, and consequently the forest rangers in charge of the different districts in which the sowing was to be done awaited the time when the ideal conditions existed, when they took up the work of sowing the two to three hundred acres on their districts. It was no easy task to sow on steep, rocky slopes with the thermometer registering from ten to twenty degrees below zero and with the snow falling. Some of the rangers were fortunate enough to have areas which permitted of their sowing the seed from horseback. This method is believed to be really more effective than sowing on foot, because the seed, being thrown from a considerable height, sink deeper in the snow.

The method of sowing seed by broadcasting in the snow and on unprepared ground, appeals very strongly to the forest officers who realize the magnitude of the task before them, by coming in daily contact with the vast areas which it is their duty to clothe with a good stand of timber. These men realize that they will not see their efforts result in a merchantable stand of timber, but they do know that if they can get a six to eight-inch growth yearly, on the plants which they are now setting out, they will have the satisfaction of seeing this same young growth holding the snow and thereby conserving the water supply. It is this knowledge that encourages the men to put forth their best efforts to successfully accomplish the important task before them.

FIRE PROTECTION IN THE NATIONAL FORESTS

By EARLE H. CLAPP.

Concluded from the October number.

EQUIPMENT.

FOR efficient fire protection it must be decided in advance what equipment is necessary, and this must be obtained and so distributed as to cause the least possible delay in case of fire. It is of the utmost importance that so far as possible everything be made ready in advance.

The construction of tool boxes at strategic points throughout the forests, for instance, at the crossing of important trails, ranch houses, at section houses in railroad patrol, etc., has already been discussed.

During the past two years the equipment of tools on practically all the forests has been materially increased for distribution to these tool boxes. Standard sets for specified numbers of men have been worked out depending upon the peculiar needs of each case. As everywhere in fire fighting, the tools ordinarily used consist of shovels, rakes, hoes, saws, axes, mattocks, picks, potato hooks, gunny sacks, squares of canvas, small Navajo blankets, and files for sharpening tools. In addition cant hooks, lanterns, cooking outfits and tents are furnished. Canteens and water bags must always be available. Attempts have been made to improve the tools ordinarily on the market, but so far except in the case of shoulder and saddle bags, with hose attachments for direct application of water on the fire, and chemical apparatus, designed by Supervisor Adams on the Arkansas National Forest, little progress has been made. Considerable progress, however, has been made in the better selection of the tools available in the markets. In addition to purchases, arrangements are sometimes made in advance in emergency. Field glasses are ordinarily supplied to lookouts and patrolmen who need them.

Pack trains have sometimes been secured where there is valuable timber, the danger from fires is great, and no other means of transportation is available. In several instances such pack trains have more than paid for themselves in fire protection and permanent improvement work during one season. In some cases where it is easily possible to secure pack animals, it has been necessary to purchase pack saddles, etc., and locate them at convenient places. On many forests it has been found desirable to make arrangements in advance for pack animals when there is any possibility that they will be needed.

The effectiveness of a fire fighting force is greatly increased by proper food supplies. Aside from the question of transportation various plans depending upon local conditions have been devised for getting supplies to the men quickly and cheaply. Very often arrangements are made in advance with stockmen for the purchase of either beef or mutton on the range. During the fire season rangers frequently purchase a larger amount of supplies than usual for emergency use. Wherever advisable special arrangements are made in advance at ranch houses, or at stores in order to make sure that suitable supplies in sufficient quantities can be obtained. It has been found helpful to prepare for immediate use, lists of supplies which will be needed to furnish

a specified number of men for definite periods. Officers are instructed to furnish a well balanced ration of substantial food.

On many forests fire guards are being appointed at a reduced salary and are furnished with subsistence. Food supplies are then purchased under competition in order to get reasonable rates, and suitable quantities of the supplies so purchased and taken to the field headquarters are available for patrolmen or in case of fire for fire fighters.

ORGANIZATION.

Since the organization for fire protection upon the forests is of the utmost importance, a great deal of attention is being given to this phase of the work. The regular and permanent force on each forest consists of a supervisor, a deputy supervisor if one is needed, clerks, and rangers who may be assisted by forest guards during the season of heavy administrative work and the fire season. The supervisor with the assistance of his deputy, has charge of the work on the forest and is directly responsible for efficiency and results. Use may often be made of clerks in handling the commissary department in emergencies. Rangers with their assistants constitute the field force proper. Depending upon the need, there may be one or more in each district. The field force act as patrolmen, fire fighters if need be, and so far as possible without detriment to fire protection, carry on the administrative work.

Experience has shown, however, that this regular force is not sufficiently flexible for the best results. It may be necessary because of unusual menace or bad fires to increase greatly the number of patrolmen, and also the number of fire fighters. Accordingly, practically all of the permits for the use or occupancy of the forest require assistance where needed in case of fire. The liability for work depends upon the size and the nature of the permit and upon the responsibility for the fire. Payment is made to permittees for assistance rendered beyond the requirements of the permit. The general character of such requirements is indicated by the following clause from a timber sale contract.

"During the time that this agreement remains in force I will, independently, do all in my power to prevent and suppress forest fires on the sale area and its vicinity, and will require my employees and contractors to do likewise. I hereby agree, unless prevented by circumstances over which I have no control, to place myself and my employees at the disposal of any authorized forest officer for the purpose of fighting forest fires, with the understanding that if the fire does not threaten my property or the area embraced in this agreement, I shall be paid for services so rendered at the rate or rates to be determined by the forest officer in charge, which rate or rates shall correspond to the rate or rates of pay prevailing in the.....
.....National Forest for services of a similar character at the time the services are rendered, provided, however, that if I or my employees, subcontractors, or employees of subcontractors are directly or indirectly responsible for the origin of the fire, I shall not be paid for services so rendered."

While having no connection with the organization, it may be well to mention that all permits where necessary include further provisions to prevent fire: In timber sales for brush disposal and the cutting of dead stubs; in grazing permits to prevent the leaving of burning camp or branding fires; in power permits for the clearing of a right of way for transmission lines; in railroad stipulations for the clearing of the right of way, the use of spark arresters, or the use of oil or electricity for motive power, etc.

In order to extend still further the reserve force for patrol and fighting.

it has been found necessary under some conditions, to appoint selected men at a per diem paid only when work is actually done. Such men are usually public spirited citizens who are glad to assist in the work of fire protection. On the Deerlodge National Forest in Montana during the present year it has been found that this plan increases materially the flexibility and efficiency of the force; in fact, the employment of one guard under this plan makes it possible on the average to secure the services of twenty additional men as laborers.

On many of the forests where it does not seem necessary to appoint men on a per diem basis, definite arrangements have been made in advance with experienced men to act as foremen of fire crews or as ordinary laborers. The arrangement which usually consists of a promise of assistance when called upon is as far as possible made to include foremen in mines, lumbering camps, etc. Foremen of fire crews are frequently paid higher wages than the men.

In addition to the classes of assistance already indicated, it is usually possible to secure the services of large numbers of other men if needed. This, however, may cause delay, and it may be necessary to take unsatisfactory workmen, or be impossible to get sufficient numbers. On some of the national forests special conditions obtain so that it is possible to secure comparatively large bodies of good men from one place on short notice. Such, for instance, are those forests which are adjacent to Indian reservations and in some few cases forests which are adjacent to forts.

In very great emergencies where property of great value is at stake and there is danger of the loss of human life, it is always possible to call for assistance from the United States Army. It is planned, however, to make this call a last resort because of the great expense of getting men to the scene of action, and because the centralization policy of the War Department makes it impossible under ordinary circumstances to have small forces of soldiers scattered through the forests.

Provision for the regular forest force to be supplemented in case of need by various reserves as discussed, does not emphasize sufficiently the occasional and urgent need for transfers of men between forests. During the serious fires of the summer of 1910 it was found that the need for laborers was not so great as the need for experienced men to take charge of fire fighting crews or to carry on patrol work. To some extent this situation was remedied by the transfer of rangers. Such action may, however, be dangerous or impossible because the regular force is comparatively small. Gradually, however, as the number of men with some training increases, this problem may solve itself and it may easily be possible to secure the services on one forest for transfer to another, of good men outside of the regular force.

PATROL.

The arrangement of patrol for a forest while apparently very simple, is actually difficult, and this is more apparent when one realizes the many adverse conditions under which it is frequently necessary to work and the necessity in spite of these conditions for getting good results. All of the forest must be covered, it must be covered frequently enough to prevent disastrous fires, and not more frequently than necessary, thus reducing the funds available and the patrol needed in other places.

Patrol on the national forests is of two general kinds: (1) that from lookout points; and (2) that by men who walk or ride or depend upon some other means of transportation. The lookouts are either stationed on more or less commanding peaks and remain there constantly during dangerous periods, or visit the peaks at specified hours and in addition, after electrical storms. It has been found that the highest peaks may not under some con-

ditions answer so well the purposes of intensive patrol as lower peaks from which it is impossible to get a nearer view of a smaller area. On some forests it has been found advisable to use the higher peaks when this is possible, and to abandon them for the lower peaks and the closer patrol if the atmosphere becomes smoky. The chief advantage of lookout patrol is the comparatively large area which it is possible to keep constantly in view. Lookout points are much more effective when in direct communication by telephone, heliograph, or otherwise with the headquarters of the forest. The great disadvantages of lookout patrol are that it gives little or no opportunity for administrative work, and it does not enable the patrolman to keep in close touch with forest users, residents and transients.

The topography of some districts is such that lookout patrol is impossible, and it is necessary to depend entirely upon men who ride or travel through the country. In many ranger districts it has been found absolutely necessary to keep in close touch with forest users, residents, freighters, campers and hunters, and also other classes of transients.

For efficient riding patrol where contact with any class of people is not the principal object, it is necessary to follow the high ridges and to get on to peaks or into open places from which the surrounding country can be seen. Riding patrol may be coordinated to a greater or less extent with the administrative work which is necessary during the fire season. In ranger districts where there is only one man it is obviously necessary that he perform both duties.

On forests which are traversed by railroads using coal-burning locomotives, it is frequently necessary to detail special patrolmen to follow all heavy trains, and in some cases to follow every train. Launches are useful upon the larger lakes where a good view can be obtained of the surrounding country. In districts with good roads much might be gained by the use of motorcycles.

In addition to the regular patrol it has sometimes been found advisable to secure the services of ranchmen or others, who with little or no riding are able to see a considerable part of a forest. These men in many cases do no more than report the fires discovered to the nearest forest officer. Fires are frequently reported as already indicated by patrolmen employed by the state, associations, companies, or individuals cooperating with the Forest Service.

On very few of the forests has it been found possible to adopt entirely any one form of patrol. The best results are obtained by a combination of lookout and riding patrol depending upon the conditions in each case. In Montana and northern Idaho the lookouts are used on the higher peaks and cover most effectively the country immediately surrounding these stations, while patrolmen ride through the lower valleys or along the ridges which overlook them. The fact that administrative work must be carried on during the fire season prevents the use of lookout patrol alone.

The area which can be covered by a patrolman depends upon a number of varying conditions which include: (1) The value of material to be protected and the degree of risk; (2) the frequency with which patrol is necessary; (3) topography; (4) whether patrol is from lookout points or by riding; (5) upon available means of travel and communication; (6) the clearness of the atmosphere; (7) the experience of the patrolman and his knowledge of the country; (8) the cooperation received from adjoining ranger or patrol districts or from adjoining forests; (9) the cooperation which may be received from other sources; (10) the necessity for administrative work; (11) means of subsistence.

There are a number of other points which must also be considered in providing for patrol on any forest. The force must be exceedingly flexible. At times during the fire season after light rainfalls, it may be possible for a few

days to use lookouts and patrolmen on other work, and on the other hand, the situation may become exceedingly dangerous, and it may be necessary to increase materially the number of men employed. During a bad season the atmosphere may become very smoky, and it may be necessary to abandon all lookouts and to depend entirely upon other patrol. For instance, during the bad fires of 1910 in the northwest it was impossible for the patrolmen to see fires until almost on them. During different parts of the fire season variation in patrol may be necessary because of the locations at which fires may start. At the beginning of the season, for instance, all the fires may be in the lower valleys, while the snow is still melting in the higher mountains or the movement of transients may also have a very material effect upon the possible location of fires.

While there is any fire danger the patrol must be regular. Patrolmen and lookouts must be on duty every day, including Sundays and holidays. Men who are incapacitated must be replaced immediately. When fires are discovered provision must ordinarily be made for a continuation of patrol while the fire is being extinguished, otherwise it may be possible for others to obtain a serious start before discovery. To insure regularity, it is necessary in many cases to make arrangements for the transportation of mail and supplies to lookouts and patrolmen.

On practically all of the national forests it is necessary each year to break in a number of green men, and some provision must ordinarily be made for their instruction and training. Much depends during the fire season upon keeping open existing lines of communication. It is therefore necessary to provide for frequent testing of all telephone lines, and frequently upon the more important telephone lines a special daily or periodic patrol is advisable. Where tools are stored at various points on the forest, it may be well also to require patrolmen to make sure at frequent intervals that they have not been removed, and that they are returned promptly after use at fires. Lookouts are usually required to communicate daily or at regular intervals with the supervisor's headquarters, and on some forests provision also is made for checking occasionally the work of the more inexperienced patrolmen who may not be well known to the supervisor. On many of the forests the supervisors require patrolmen to carry with them constantly certain tools, and in parts of the northwest the men are also required to carry certain amounts of supplies.

FIGHTING FIRES

Everything should be in readiness for immediate action when fires are discovered. The patrolman or ranger should know just where to go or to send for his men in order that he may secure a sufficient number of the right kind of men at short notice. In practice it has been found exceedingly difficult to judge the number of men needed, and to keep the right number until all danger is past. Care must be taken that the force is not too large in order that the expense of fire fighting may not be increased unnecessarily. It must be certain that the proper equipment is sent and that the force will be promptly and continuously supplied with suitable food. Upon arrival at the fire, camp sites must be selected; the officer in charge must at once size up the situation and organize his crews. In the attack on the fire advantage must be taken of all conditions which will be of any help, such, for instance, as variations in a stand of timber, topography, open areas, etc. No two fires are alike, and each one to be handled to the best advantage must be attacked in a different way. General directions in regard to fighting fires are helpful to the men in charge, but experience is better. Finally, fires must not be left before they are extinguished. This mistake has been made repeatedly because there seemed

to be no possibility that the fire would escape. In some cases such apparently trifling things as a failure to leave enough supplies for the men left to guard an old fire has been responsible for its breaking out a second time.

Manuals of directions for fighting fire are being prepared, and when they are completed will be helpful in increasing the efficiency of the work.

The question of fire protection is now being studied more intensively in the Forest Service than ever before, and as a result greater progress is being made. Investigations, some of which have already been indicated, are being conducted along many important lines. The completion of fire plans for all the forests with provisions for their improvement in the light of experience and the results obtained through investigation, insures continued progress in the future.

THE MINNESOTA FOREST EXPERIMENT STATION

BY DILLON P. TIERNEY

IN THE development of the resources of a timber region there are many problems which come within the province of the forester to solve. The fundamental principle is that the soil should be put to the use for which it is best suited. In addition to land whose worthlessness for farming purposes is self-evident, there are lands, which it is possible to cultivate, but which are so poor that their most profitable use is forestry and not agriculture. Agriculturists are usually unwilling to admit or specify that certain classes of soils are unprofitable from their point of view. In order that the forester may not be forced to confine his activities to reforesting bare rocks and mountain peaks, he must show the agricultural propagandist what are forest lands and how they can be used. Since the northern part of Minnesota is blessed with a fair proportion of purely forest land, it behooves the state to see to it that it is kept in the most profitable timber growth, just as it is now working to get the good agricultural lands under cultivation.

The importance of securing accurate data from forestry experiments conducted under favorable conditions and competent direction was realized by a number of public-spirited men of the state, and it was through their efforts that Minnesota established the first forest experiment station. By an act of the legislature, approved March 31, 1909, the state received title by gift and purchase to approximately 2,700 acres of forest land near Cloquet. This tract is to be under the direction of the university board of regents, "to be used as a practice ground, demonstration forest and experiment station for the students of the forestry department of the University of Minnesota."

Most students of forestry have undoubtedly been confronted with the problem of getting owners of large tracts of forest lands to follow certain forestry methods. Several reasons for these difficulties may exist. One of the chief reasons is a lack of knowledge as to just how any particular silvicultural method will work out under local conditions. Exact knowledge is necessary. It is not enough to assume as a basis for calculation the results that are obtained with foreign forests or with forests of some other part of the United States, although this may be very satisfying to the forester. If, for example, the forester argues that it is best to improve a heavy stand of middle-aged Norway pine by making two cuttings separated by fifteen to twenty years, the

most convincing proof he can call to his aid will be an actual and local illustration of such a system. If this proves practical and financially profitable, and if the first cut is enough to make a fair logging chance, and the remaining trees do not blow down but grow at an increasing rate, and if a number of other things turn out as they should then the forester can use this example as a reasonably safe argument. Numerous problems of this kind present themselves, and actual illustrations of their solutions are always the best arguments.

Aside from the questions of fire protection and taxation, there are many which are peculiar to the forests typical of northern Minnesota. The owners of large areas of timber lands are willing and anxious to know how their non-agricultural lands may be handled profitably; but the seemingly unimportant details and possible results of periodic cutting, planting, etc., are too hazy to carry conviction to their minds. With the hope of gaining enlightenment on these various points, the forest experiment station was provided near Cloquet, Minn., where the lumbering industry of the state is now centered.

Active work in developing this experimental tract began in April, 1910. As preliminary work it was necessary to obtain a land survey and an inventory of the timber resources. The fire danger was very great at all times, and a constant patrol was required. A system of firebreaks was planned which will include the whole area and utilize the various roads. Several miles of these "breaks" were cleared out. When completed, the firebreaks will furnish adequate protection for any experimental plots or plantings that may be made.

The larger part of the Cloquet Forest is a sand plain or "pine barrens," according to the original survey notes, on which the red pine and jack pine thrive equally well. There are also several hundred acres of light clay loam supporting a hardwood and white pine growth. This soil when cleared proves adaptable for cultivation. In the swamps are found all the plant zone gradations,—ranging from aquatic plants in the stagnant pools through sedges, cat-tails, wire-grass, sphagnum, sheep laurel, cranberry, scrub spruce, and finally into stands of merchantable tamarack and spruce.

The variation in soils on this tract makes it possible to carry on a comparatively wide range of experiments. There is also an additional advantage in having considerable growing and mature timber with which to work. Aside from the many jack pine stands, there is in one body 500,000 feet of Norway pine in a pure and practically normal stand. In another body of 350,000 feet, white and Norway pine form about equal proportions of a dense stand.

Altogether there is approximately 2,000,000 feet of white and Norway pine in several compact, even-aged stands. Plans are made to select and mark out a large number of permanent sample plots. On the plots in the mature stands, several methods of thinning will be tried, and a record kept to ascertain the relative increase in rate of growth, the effects on reproduction, young growth, and ground cover. On some plots, both under standards and on cut-over areas, broadcast sowing of several species will be tried, to determine what conditions and season of the year may prove adaptable to this method of regeneration. Under contract with the federal government, all the timber on the Cloquet Forest, with the exception of the above-mentioned selected bunches of pine, was removed last summer. Seed trees were reserved on two areas of forty acres each. Consequently, the ground which has been so recently logged over is in excellent condition to receive the attention of the experimenter.

Particular attention will be given to the work of planting the various sites to commercial timber species. About four acres of ground has been



HEADQUARTERS—IN A BEAUTIFUL GROVE OF
LARGE NORWAY PINE



MINNESOTA FOREST EXPERIMENT
STATION

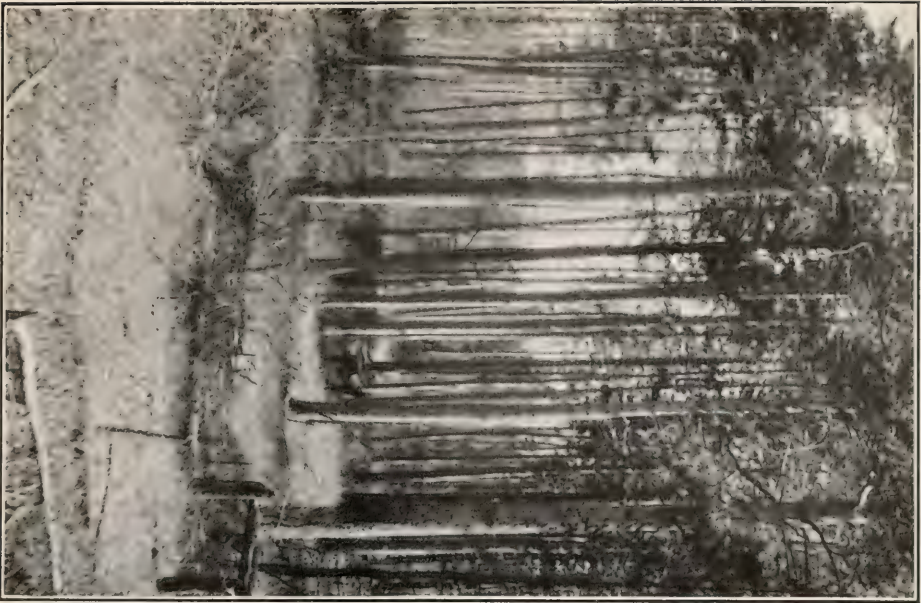
A VIEW IN THE CLOQUET FOREST



THE STATION HEADQUARTERS IN WINTER



IN THE CLOQUET FOREST AFTER A HEAVY SNOW-
FALL



A NORMAL STAND OF PURE NORWAY PINE; AVERAGE FIVE LOGS PER TREE



MINNESOTA FOREST EXPERIMENT STATION

SCALE OF THE SANDY RIDGES ARE ENTIRELY FREE FROM UNDERBUSH AND REMIND ONE OF SOUTHERN PINE FORESTS



WATER OAK IN GAINESVILLE, FLORIDA,
ABOUT THIRY YEARS OLD

cleared for a nursery, and already a beginning has been made in starting the seed beds. There is ample room for growing garden truck, small fruit and an orchard, which, in addition to supplying the workmen with fresh and wholesome food, will also keep up public interest until the slower and less striking silvicultural experiments are well under way. The prospective agriculturist in this locality is anxious to know what crops may be raised, and it is quite likely that what little garden and field crops are raised will show how unprofitable it is to farm on most of the jack pine sand lands. That typical jack pine lands are unsuited to agricultural purposes has often been shown by the starving out of settlers on them, but careful experiments here are expected to give more exact information on the reasons for these failures.

In a beautiful grove of large Norway pine a two-story log building has been erected for the accommodation of the foreman of the forest. An additional log dwelling will be constructed for the technical superintendent, who in the summer time will be on the ground in charge of the experimental work. The place is about three miles from the city of Cloquet, on a good and well-traveled road. It would be hard indeed for one to find a more favorable and interesting place for free and uninterrupted research and study.

THE WATER OAK AS A SHADE TREE

By C. D. MELL.

TREES in every respect desirable as shade trees in towns and cities are rare. Unfavorable soil and atmospheric conditions, insect and fungous enemies and other injurious factors characteristic of the city street, limit the number of shade tree species to a very few; but when one does find a good tree for street purposes and a hardy oak at that, it becomes a matter of no little interest. The water or spotted oak of southeastern United States is that kind of a tree. It is undoubtedly one of the best street trees of the southeast, and as such it is used in practically every town in the states of Georgia and Florida, and is now rapidly replacing a good many other less desirable species in towns as far north as North Carolina. When young the tree stands transplanting very well, grows quite rapidly, and has beautiful foliage which is never too heavy to allow free circulation of air. It loves soil moisture, but, nevertheless, stands seasons of drought better than any other oak suitable for shade. It usually attains its most magnificent proportions as a street or park tree and seldom needs trimming. The water oak is free from injurious insects.

In the southeast it is the most commonly distributed of all the oaks, and is found as far north as Delaware and extends westward through the Gulf states to the valley of the Colorado River in Texas. This oak obtains its common name from the fact that it is generally found growing on the borders of swamps and streams and on rich bottomlands of rivers. Old trees of this species are often hollow at the center, forming hiding places for opossums, and for this reason the tree is also known as possum oak in Alabama and Texas.

The scientific name is *Quercus nigra* Linn. (*Q. aquatica* Walt.). The technical name of oak, *Quercus*, is taken from the Latin, but is derived from the Celtic words *quer*, meaning "fine," and *cues*, "tree," in reference to the

highly esteemed qualities of these trees. The specific name, which is the Latin name for black, was given to this tree on account of the very dark green leaves and the small dark brown colored acorns. The genus *quercus* belongs to the family of trees which produce inconspicuous flowers, the sterile being in slender green catkins and the fertile or fruiting ones solitary or clustered, appearing in the spring. The species *nigra* is of the class known as black or red oaks, which mature their fruit regularly every two years. This is contrary to what takes place with the members of the white oak group, which mature their fruit annually. The twigs are slender, light or dull red during the first winter, becoming light brown the following year. The leaves are usually oblong-obovate, gradually narrowed and wedge-shaped at the base. The apex is generally rounded or entire or less often three-lobed; the lobes are seldom sharp or bristle pointed, which is a character of the leaves of black or red oaks.

Water oak usually varies from 50 to 75 feet in height, and has a trunk from 2 to 4 feet through. The branches spread gradually from the stem and form a symmetrical round-topped head, especially good for a shade tree. Any one familiar with the water oak will concede that it is one of the handsomest and most useful oaks of southeastern United States. Large specimens which are sometimes 100 feet high, develop a head of unusual regularity and beauty. In the moist soil near the border of a lake or along a stream, the favorite situation of this tree, it is forced upward in search of light and then forms a more or less spire-like top. In open situations with a sufficient light and growing space, the branches spread out horizontally and form the broad head which make some individuals of this tree as handsome and symmetrical almost as it is possible for an oak to become. South of central Georgia the leaves of this tree are persistent throughout the year. They remain lustrous green until they are gradually shed in the spring of the year after the new leaves have come out; in its most northern habitat, however, the leaves gradually fall off during the winter.



COOPERATION IN FOREST PROTECTION

By E. T. ALLEN.

EDITOR'S NOTE.—In this article Mr. Allen further develops the cooperative protective idea of which his association is the most striking example, an idea previously set forth by him for AMERICAN FORESTRY readers in June of this year.

GIVEN in normal years, the cost to government, states, counties, towns and individuals of protecting life and property in this country from forest fires runs into millions of dollars. In bad years like 1910, it amounts to many millions. This is the cost of the work itself, not including damage by destruction. To a very great extent these expenditures are wasted and the destruction is increased by lack of cooperation; by duplicated effort and duplicated neglect in the field work itself, by inharmonious policies, and by failure to unite in propaganda and law-making forces strong and numerous enough to be irresistible if united and directed.

An invaded country meeting the enemy's army with many independent forces, fighting without knowledge of each other's strength and policies and even without attempt at conference and communication, would be regarded with astonishment by the world. It is hard to conceive of a city in which expensive fire-fighting equipment would be maintained at stations established without reference to each other's location, with the firemen scattered and unorganized, and without means of cooperation in emergencies. To the modern mind even pastimes, such as base ball and foot ball, imply team work and constant study of ideas contributed by every member of the organization. These are but a few familiar illustrations of a principle recognized in almost every line of human endeavor—that intelligent cooperation is immensely more effective than independent inharmonious action by individuals or disconnected units. No story is more familiar than that of the bundle of fagots which could not be broken until separated; no motto than "in unity there is strength."

In nothing more than in fire prevention is concerted harmonious effort essential to bring the best results. Nevertheless, with a few notable local exceptions, our several agencies most keenly interested in the subject are still facing its problems pretty much independently. Chief among these agencies are the federal forest service, the progressive element among timber owners, state forest administrations, and factions of public-spirited laymen interested only in community good. In some states only one may be active, in others all may be, but seldom do they act in thorough concert. The stage of mutual distrust and deprecation seems about past, but communion is still mostly confined to occasional conferences where papers are read and resolutions are passed. There is little systematized working provision for enabling each agency to profit fully by the interest of the others.

Leaders of field work experiment with organization systems, equipment and methods, sometimes at frightful cost, because no means exists for learning and applying the experiences of others. Independent patrolmen and fighting forces duplicate or conflict in one locality while another goes unguarded. Police authority is exerted with varying interpretation of the law. The most important work of all—teaching all classes not to start fires—is prosecuted

spasmodically and unsystematically at greater cost than would be required to do it intelligently. The writing of laws is often done by one element with an unfamiliarity with others' problems that brings minimum efficiency if not actual conflict. Particularly is it done without the knowledge of fundamental principles in state forest administration which can be learned only by study of results in other states. Good bills fail of passage, or bad ones pass, because of failure to work together effectively in making and directing public pressure upon legislatures. Underlying these difficulties of detail is the great task upon which complete success in any of them depends—establishing in American citizenship a universal and sound grasp of forest economies, including not only the relation of forest preservation to public welfare, but also those governing conditions of production and market, loss and profit, practicability of method, and division of private and public responsibility, ignorance of which now creates suspicion and prejudice between forest owner and forest user. This task calls for closer and more constant relations between all elements concerned than now generally exist.

That lack of mutual understanding and its inevitable attendants, divided effort and conflict, are the most powerful deterrents of progress and yet unnecessary has been clearly taught by the experience of the Western Forestry and Conservation Association. This organization, now well known to everyone acquainted with American forestry, was originally formed for the interchange of ideas and experiences by the several cooperative patrol associations maintained by Idaho and Washington timber owners. Quick realization that quite as important as actual fire fighting is persistent honest education, both without and within the timber industry, led to the employment of a forester and the joint financing of educational work at once more economical and more consistent than could be carried on independently.

Immediately, however, the function of the alliance as a clearing house for ideas and experience appealed to all others engaged in forest work, and it was enlarged to admit state and federal forest officials, conservation associations, and new fire organizations of timber owners in adjoining states. This broadening not only placed it securely on a footing of unselfish reliable authority recognized by the public and already extremely effective in improving laws and sentiment, but also brought about a marked change in the relation of its constituent elements. The conservation enthusiast, the federal officer, the representative of state administration, the practical lumberman—each learned that the others were good citizens and could teach him about as much as he could them. Above all, they learned each others' problems and that none could succeed without respecting all. They began to work together, with results gratifying beyond expectation, and this was accomplished not by changing human nature, but solely by providing a means by which they could get acquainted and work together.

But the Western Forestry and Conservation Association is an interstate institution extending from Montana to California and, while ready to help locally where wanted, is equally scrupulous not to force interference or conflict with the individual policy of its constituents in any particular state. This has allowed a clear view of progress by states which teaches an illuminating lesson—that progress is in exactly the measure that the states themselves have applied the principle of cooperation locally. Where timber owners have carried cooperative patrol to the fullest degree and abandoned independent duplicating systems, better protection is had for less money, and public and lumberman alike are more careful in the use of fire. Where there are the fullest and most constantly employed facilities for actual cooperation in work and finances by private owner, government and state, there is the greatest

efficiency at least expense and particularly is there the greatest advance in law-making, law-enforcing, and public sentiment generally.

It is an up-hill task at best to prevent the appalling mistreatment of American forests. Friction among those who are trying to prevent it is expensive folly and it comes from misunderstanding. Misunderstanding comes from lack of acquaintance. The real desire of public, lumberman, state and government is the same. The forest fire problem will be quickest solved where law and policy are for associating in organization and expenditure the government, the state and the forest owner.

TIMBERLAND PROTECTIVE ASSOCIATIONS

By E. A. STERLING.

WHEN the smoke of each forest fire season has blown away, we amuse ourselves by aimless guesses as to the property loss, take a few pictures of the blackened landscape, and wonder if it will be wet enough next year to prevent the destruction which our own feeble, human efforts seem powerless to stay. About this time of the year the autumn forest fire season will be on in the East; while in the West the summing up of the year's achievements and the stock taking of the damage done will be under way.

Sweeping back the sea with a broom would be child's play compared to controlling forest fires during a bad season with the pitifully inadequate facilities which have been available. States with forest property assessed at a hundred million dollars have in their munificence appropriated as much as \$10,000 a year for fire protection, and then wondered why their burning wealth cast a pall of smoke over the country for weeks. With an insurance rate of one-hundredth of a cent on the dollar, some of the worst-burned states have gotten just about their money's worth. Some of the states are now more liberal, and with their awakening comes renewed hope; but the states are not alone responsible for the fire havoc which has been permitted to be wrought.

To try to tell of the various reasons why our forest fire losses have averaged the value of a battleship a month for many years would make a long, sad story. Like many sad stories, however, it promises to have a happy ending, and in this we will find pleasure.

This year, next year, and for many years, climatic conditions will largely determine whether the fire season has been a disastrous one. Each year, however, with the progress now being made, the weather will become a less potent factor, and in the exact proportion in which the human agencies triumph over the natural can be reckoned our control of forest fires.

Forest fire protection is now the chief end and aim of three active forces: the Forest Service, the states, and the fire protective associations of the timberland owners. Another less definite influence is that of public sentiment, which is slowly assuming an attitude of antagonism toward forest fires. Each of these agencies is becoming efficient in itself, and all are working together when co-operation furthers their mutual interests.

The timberland owners were the last to organize, although their need was perhaps greatest. Now that they have found the way, remarkable progress is being made, and it is this work that will be briefly outlined here.

Three years ago the Western Forestry and Conservation Association was formed, and for the first time in the history of the lumber industry mutual interests were organized for the suppression of the common evil—forest fire. This association has grown until it embraces the five states of Montana, Idaho, Washington, Oregon, and California, and is now prepared to do what the states have failed to provide for: the protection of private timberlands and the capital invested in the lumber industry.

As an association it has no individual members, but is an alliance of local organizations in the five western states. At present eight active fire associations, with about four hundred timberland owners, are included in the parent organization. Originally, there were fifteen local associations represented, but five in Oregon have turned their work over to the Oregon Forest Fire Association, and of the ten remaining, two are the Washington and Oregon Associations, which have a large membership but do no field work.

The Western Forestry and Conservation Association is the clearing house, as it were, of the affiliated associations, and as such does not spend money for direct protection. The field work is handled by the constituent organizations, and while the general plan is the same, the details vary in accordance with the local conditions. A chief fire warden directs the field operations, but a governing board outlines policies and determines the expense limits. Some of the associations undertake the entire burden of expense for their members, while others maintain only a skeleton system.

Some of the more essential features of the fire association work are flexibility in organization, so that the field force can be increased promptly in emergencies; the availability of funds to carry on the work; systematic patrol; prompt action in fighting fires which start; preventive measures, such as burning dangerous slashings, keeping railroad rights-of-way clear, etc.; co-operation between the various federal, state, corporate, and private interests concerned; and educational work among all classes.

Space does not permit of outlining the work of the various associations, nor of the developments in both the East and West which have followed the initial organization of the Western Forestry and Conservation Association. The following brief summary, however, will show the status of the fire protective association work practically up to date.

Western Forestry and Conservation Association.

This is the pioneer association, which combines fifteen local fire associations. At present its active membership includes the Northern Montana Forestry Association, the Coeur d'Alene, Pend d'Oreille, Clearwater, and Potlatch Timber Protective Associations, the North Idaho Forestry Association, and the Lincoln-Benton and Inland Forest Fire Associations. The area actually represented is about 6,500,000 acres, but nearly 20,000,000 acres are patrolled.

The assessment for actual protection varies from one to fifteen cents per acre, with an average of two to three cents. The expenses of the parent organization are provided for by an independent assessment of one-quarter cent per acre.

During the unusually bad fire season of 1910, the affiliated associations and their members spent about \$667,000, but kept the fire losses on the private property represented down to about one-half of one per cent. The value of the timber property protected, including its stumpage value and as a resource, is estimated at not less than four billion dollars.

The Forester and active head of the Association is E. T. Allen, Portland, Oregon.

Pend d'Oreille Timber Protective Association.

This is one of the representative associations allied with the Western Forestry and Conservation Association.

The association was organized in 1907, and now directly protects about 350,000 acres, mostly the property of small holders.

The assessment for 1911 will amount to about two and one-half cents per acre.

The officers of the association are A. C. White, President; E. O. Hawksett, Vice-President; and T. J. Humbird, Secretary and Treasurer.

Oregon Forest Fire Association.

This association represents five local Oregon organizations, with eighty companies and individuals as members.

The timberlands represented approximate 2,000,000 acres.

The cost of protection varies from one-half to five cents per acre, with an average of about two and one-half cents.

About 350 wardens are engaged in looking after private timber holdings, and in 1910 \$130,000 was spent in patrol work.

The general work of the association is summarized by the secretary as follows: "In general, the work of this association so far has been: 1st, to encourage patrol and endeavor to perfect patrols where they are inefficient. 2nd, to endeavor to so co-operate with the government, state and counties that all the fire protection work will count. 3rd, to give proper publicity to the importance of Oregon's timber resources and point out the interest every citizen has in this resource and consequently the need for its protection. 4th, to furnish a means for taking up matters of public importance, affecting the timber resources of the state, which cannot be handled by the State Forester. 5th, we also put in patrols and look after property for non-resident owners desiring this, making no administrative charge for doing this work."

The officers of the Association are: A. P. Sprague, President; Chas. G. Briggs, Vice-President; John Pearson, Treasurer; and C. S. Chapman, Secretary and Manager.

Washington Forest Fire Association.

The association is composed of Western Washington timberland owners, the present membership comprising 153 companies and individuals.

The timberland represented approximates 2,700,000 acres, and in addition, about 100 miles of railroad are patrolled.

The assessment in 1910 was two cents per acre, and will be about the same in 1911.

About 80 men are employed in addition to the inspectors.

The President of the Association is George S. Long; Vice-President, Thomas Bordeaux; Secretary and Treasurer, M. R. Hunt; and Chief Fire Warden, J. L. Bridge.

Northern Forest Protective Association.

Organized in 1910, and the first fire association to be established in the Lake States. The present membership of 100 represents slightly over 2,000,000 acres, although approximately 7,000,000 acres receive the benefit of the patrol.

The cost of protection for 1911 is one-half cent per acre.

This association is similar in organization to the Western associations, and the same excellent results are procured. Patrol and an educational campaign are the main features of the 1911 work.

The President is Thornton A. Green; Vice-President, C. V. R. Townsend; Treasurer, James E. Sherman; Secretary-Forester, Thomas B. Wyman.

New Hampshire Timberland Owners' Association.

The only association of the kind in the East. It has about thirty members, representing about 1,500,000 acres.

The association maintains lookout stations, patrols, etc., and co-operates with the federal government and the state under the provisions of the Weeks law, whereby funds are appropriated for fire protection in certain states. It has six permanent patrolmen and puts on additional men during seasons of fire danger. The total number of patrolmen in the fall will be about fifty.

The cost of protection to the association is about five-eighths cent per acre.

W. P. Brown is President; W. H. Bundy, Vice-President; and F. H. Billard, Secretary-Treasurer-Forester.

The total area actually represented by the voluntary timberland protective associations, after three years growth, is about 15,000,000 acres; but not less than 30,000,000 additional acres benefit by the patrol. The efficiency of the protection on this area is not exceeded anywhere outside of the National Forests. If ever there was a trial by fire it was last year, and the associations came out of it with remarkably small loss.

The measures they are applying are mainly common sense methods which only needed systematizing to become effective. Patrol, telephone lines, trails, tool caches, and education have been recognized for years as essentials of forest fire protection. The new features developed are largely administrative. The ability to get together and work together in applying a definite system is what has accomplished results. That it will pay cannot be doubted; while the fact that the lumbermen are willing to contribute liberally for fire protection that protects shows that their business judgment is sound. They will accept forestry just as willingly *if it can be made to pay*.

What is needed now is an extension of the fire association idea to the forests of the East and to the pine lands of the South. Nor is it a far cry to almost universal co-operation between timberland owners which will reduce their fire losses to a nominal figure. Much depends on the protective associations now in existence; if they fail, few would have the heart to try again; if they continue to be effective, the way is open for similar protective measures in all of our private forests. The states and the federal government can greatly assist the organized private timber owners by protecting their own lands and by co-operation and sane legislation.





AGRICULTURAL BUILDING, HOME OF THE SCHOOL
OF FORESTRY, UNIVERSITY OF GEORGIA



A SUMMER SCHOOL CAMP OF THE GEORGIA
FOREST SCHOOL



A LESSON IN DENDROLOGY



CALIPERING TREES IN A MIXED HARDWOOD STAND,
COLLEGE FOREST, UNIVERSITY OF GEORGIA

FOREST SCHOOLS OF THE UNITED STATES

VI.

The University of Georgia

THE Forest School of the University of Georgia was created in 1905 by an initial foundation given by George Foster Peabody of New York, and it was opened in the year 1906-1907 as a division of the State College of Agriculture, which is an integral part of the University. It is located at Athens. For practice work near at hand there are about one hundred and fifty acres of the college farm that are woodland. There is also some land once cleared, but not suitable for tillage. The wooded portions are being brought under forest management and the non-agricultural lands are being reforested.

Of the work of the department one course in the economics of forestry is designed to bring out the importance of the forest to the state and nation. Two give elementary instruction in forestry to familiarize agricultural students with the management of farm woodlots and the execution of forest working plans. Still others give instruction in professional forestry for those who intend to go into the lumber business or to follow forest engineering as a profession. By means of publications and lectures before schools, farmers' institutes, lumbermen's associations and other interested organizations, an endeavor is made to spread popular education in forestry throughout the state. Work is done in co-operation with the owners of woodlands through co-operative agreements such as are made in some states by the state departments of forestry. For the completion of the four years' course, the degree of Bachelor of Science in Forest Engineering is given.

The professor in charge of the courses is Alfred Akerman, who was a graduate of the Yale Forest School and later on its faculty, and was the first state forester of Massachusetts, leaving that position to take charge of the new foundation in Georgia. Professor Akerman emphasizes the fact that his school is not laying stress upon professional training. Professional courses are given as a matter of convenience to those students who wish to begin their professional studies as undergraduates. But he advises these men that they should supplement their course with graduate work there or elsewhere, preferably where they can have the best laboratory equipment and the help of a faculty of specialists. It is obvious that the whole field of professional forestry cannot be adequately taught by one instructor, and Professor Akerman increases one's confidence in the strength of his work by his frank admission of this fact.

The school is doing especially good work with the seniors in agriculture. There is a large amount of woodland on Georgia farms, and a practical knowledge of forestry is an essential part of the equipment of a Georgia farmer.

The list of courses of the department contains ten subjects: Economics of forestry, farm forestry, a longer course in farm forestry, dendrology, silviculture, forest protection, forest mensuration, forest management, lumbering and utilization, and wood building materials.

All candidates for the degree are required to live for two months in summer between the sophomore and junior and junior and senior years at a lumber camp, sawmill or turpentine distillery, to keep a diary of each day's work, make an herbarium of the flora of the locality and prepare a thesis of the operations being carried on. It is preferred that students secure some employment connected with the operations. This practical work takes the place of the summer camp which was last held in 1910 in Florida.

A magazine devoted to the forest, fish and game interests of the South is edited by the professor of forestry, assisted by the forestry students. While this is primarily a students' publication, it contains material of interest and value to the general reader of timberland owner.

The school is doing careful work along conservative lines and making the most of its facilities.

COLLECTING LODGEPOLE PINE SEED

BY A. M. COOK,

SUPERVISOR ARAPAHO NATIONAL FOREST.

EDITOR'S NOTE.—A general account of methods of collecting and handling seed in the national forests by Sydney Moore was published in this magazine for March, 1911. See also a series of pictures, "Reforestation in the National Forests," May, 1911. The present article deals more intimately with a particular phase of the work on one forest, the Arapaho in Colorado.

IN addition to the regular duties of the rangers on the national forests, such as overseeing grazing and timber sales, and building cabins, roads, trails, and telephone lines, the annual harvesting of the cone crop has become a very important task for which considerable preparation and forethought are necessary. In the state of Colorado no kind of tree seed is more desired for reforestation the waste places of the mountain country than lodgepole pine.

Although it grows to no great size, lodgepole pine is of importance whenever it is found in abundance. Without its help the rancher would be at a loss for material for fences, log houses and outbuildings, and telephone poles. By far the larger part of the Colorado mines are timbered with material from this pine. But its use in the round does not exhaust its possibilities. Good common lumber, hewn railroad ties, and box boards are more and more in demand as Colorado grows and its resources are developed, and the Forest Service does well to join hands with nature in the propagation of a species which will fill this demand.

It takes two years for the seeds of lodgepole pine to ripen. During the first summer the little cones form near the tips of the branches towards the tops of the trees. They are a rusty red or purplish color, and shade in so well with the colors of the bark and foliage that they are hardly noticed unless especially sought for. During the first winter and the second spring the young cones develop rapidly. By July of the second summer they have reached full size, and can readily be seen glistening bright green among the leaves towards the outer ends of the branches. The tiny seeds themselves are black and remain concealed inside the cone until the squirrels, the action of the alternating heat and cold of the mountain climate, or the scorch of a for-

est fire parts the woody cone scales and allows them to fall to the ground. For two years the ranger has had a chance to size up the coming cone crop, decide on the most likely localities in which to harvest it, and lay his plans for the work early in the summer. He has reported to his superior officer the results of his field observations, and, in view of a shortage of seed in one locality, plans can be laid well in advance to make good the deficiency by concentrating on places where the crop is known to promise abundance.

There is only one good way to collect the cones of the lodgepole pine. Pulling the cones from the branches by hand, or cutting them from their stems with a keen-edged, sickle-like knife, or knocking them off with a pole have all been found to be both slow and uncertain. Only with difficulty can as many as a bushel of cones a day be secured by any of these ways. But the gay little pine squirrel, frisking about the woodland, leaping from tree to tree and chattering at you frantically as you walk beneath, has come to the ranger's help. Along about the middle of August these care-free denizens of the forest world begin to realize the need of providing themselves with a store of food against the coming of the long winter. Every pine gives its tribute to them of its best and ripest. Instinctively the squirrel knows the best cones, and few that are wormy or empty ever are tucked away in a squirrel hoard. Scampering to the topmost branches, the squirrel cuts off the cone from its tough stem with his keen little teeth. He will seldom bother to conceal his hoards more than by the protecting shelter of an old log, or a shallow hole by the base of a rock or stump. Here he piles up from a few quarts to several bushels of pine cones. But with increasing riches Mr. Squirrel gains craft. "Put not all your eggs in one basket," is an adage which he apparently knows by heart. For he will not store long in any one place. Under this log and that log, behind that rock and in this old root he believes in experimenting with many exposures and many storehouses. For the cellar must not be too damp and let the cones mold, nor must it be where the snow is likely to get too deep and too hard packed. As one walks through the forest in autumn he will find that there is scarcely a down log that does not conceal on its uphill side a store of pine cones. For this reason it is practically impossible for a cone gatherer to take away more than a part of a squirrel's hoards. Furthermore, a hoard emptied one day will generally be found by the end of a week to have been partly or wholly replenished, unless, as rarely happens, the little worker has been frightened away.

Towards the middle of August, in most localities, the squirrels have actively begun collecting their winter's supply of cones. By September 1, in a favorable year, the fire season is nearly over and the ranger's other lines of summer work are drawing to a close. Providing himself with sacks, a bucket and good stout gloves, the ranger starts for that part of the forest where his two years of observation have prepared him to find a good supply of stored cones. Moving the old logs he lays bare the hoards he is after. The bucket is quickly filled, emptied into one of the gunny bags, and replenished from the next promising supply. All of the cones found in squirrel hoards are not equally good either in the number of fertile seed they contain or in the ease with which they can be made to give up their seed. The small gray cones, for instance, which have been on the trees for several years, are not as good as the fresher, more plump brown and purplish cones, which generally are not over three years old. The cone gatherer aims to put few of the gray cones in his sack.

The gunny bags hold about two bushels of pine cones, and it is not unusual for a man to gather six or eight sacks full in an 8-hour day. When a good-sized pack load has been assembled the ranger brings up his horses.

with their pack saddles and panniers, and carries the cones to his station or other point where it has been decided to concentrate the work of extracting the seed. As it takes at least two pounds of seed to sow an acre of ground, and not much over a third of a pound of seed can be expected from a bushel of cones, the number of cones that must be collected annually is large, and one man gets only about enough seed in a day to sow two and one-half acres. It is not customary, therefore, to depend wholly on the results of the rangers' collecting.

After the busy haying season is over, men, women, and children of the country are free to turn out on the fine autumn days and gather the cone harvest. About forty cents a bushel is paid, and sacks are furnished the pickers. When coming to town for ranch supplies, or at times when the teams are not working, the sacked cones are brought in to the cone house at Fraser, measured and stored in bins, to await extraction. Helped thus by their neighbors, the rangers easily assemble all the lodgepole pine cones desired.

When the arrival of winter puts an end to collecting, all the work centers in the cone house. Inside this is a good-sized dry kiln, built of two thicknesses of lumber and lined with tight paper. The kiln is provided with tiers of racks or trays, between which are coal heaters. The front is arranged to open so that the wire trays can be lifted out bodily for filling and emptying. The kiln should easily hold 15 or 20 bushels of cones at one time. After the trays are filled, fires are built in the stoves and the temperature raised to 100° F., the heat being regulated by means of trap doors on the top of the kiln. For four hours the cones are kept at this moderate warmth. Then for four hours the temperature is kept at about 130°.

After the eight hours have elapsed, all except a very few of the cones are open, and a vigorous tapping or shaking causes the released pine seed to scatter out. This shaking of the cones can be done mechanically by revolving them in a long cylindrical framework covered with coarse wire screening. One end of the cylinder is raised 8 inches higher than the other, and as the cones pass down, tumbling over and over, the seeds rattle through the wire on to the sheets spread beneath and the empty cones drop from the lower, open end into the wastebox. As all experiments in reseeding are done with known quantities of dry, clean seed, it is very desirable to separate the seed, fresh from the cones, from the wings, chaff, pine needles, and dirt. So the ranger sweeps up the seed from the sheets below the shaker, and puts them twice through a fanning mill, similar to those used by farmers in winnowing grain. The clean seed is packed in cotton bags that hold 4 pounds each, and stored away until the time comes for sowing in the field.



BILTMORE FORESTERS HELPING IN LOADING LOGS



RETURN TO CAMP AFTER A HARD DAY'S WORK



RETURNING FROM AN EXCURSION TO THE PRIMEVAL OAKS OF GERMANY



BILTMORE FORESTERS STUDYING THE GROWTH OF LONG LEAF PINE

FOREST SCHOOLS OF THE UNITED STATES

VII

Biltmore Forest School

THE Biltmore Forest School is unique in the facts that it is connected with no college or university and is a traveling school. It is about to enter upon its fourteenth year of existence. It was founded by Dr. C. A. Schenck, forester of the Biltmore estate in North Carolina, in the late summer of 1898; and during the first eleven years of its career, it was maintained on the Biltmore estate. At that time the school was spending one-half of the year in the cut-over woodlands near Biltmore and the other half in the primeval Pisgah Forest, owned by Mr. George Vanderbilt, near Biltmore. In 1909 the school severed its connection with the Biltmore estate, retaining, nevertheless, its original name "Biltmore Forest School."

The faculty consists of its director and chief lecturer in forestry, Dr. C. A. Schenck, of Dr. H. D. House, chief lecturer on dendrology and botany, and of a number of teachers selected from various universities on account of their special fitness for presenting topics closely related to forestry in concise and attractive form.

Professor George L. Clothier, of the Mississippi State Agricultural College, lectures on his specialty, prairie planting; Professor Collier Cobb, of the University of North Carolina, lectures on forest geology; Edgar D. Broadhurst, of Greensboro, N. C., on forest law; Franklin Sherman, Jr., state entomologist of North Carolina, on entomology; Dr. St. George L. Sioussat, of Vanderbilt University, on economics; Professor H. O. Allison, of the University of Missouri, on animal husbandry; Dr. Hermann von Schrenk, on timber preservation; R. S. Kellogg, on forest statistics; and Harry C. Oberholser, of the United States Biological Survey, on forest zoology. In addition, various members of the Forest Service have had the kindness to deliver annually at the school a series of lectures dealing with topics in national forestry. There is a strong probability of the co-operation with the Biltmore Forest School in its European headquarters of Sir William Schlich, upon his retirement from the chair of forestry at Oxford. Ernest Thompson-Seton will spend a week with the school in its Michigan camp.

The plans and methods of the school are framed on the belief that forestry can be taught in the forests alone; that no lectures are so good as those illustrated by object lessons; that a forest school must be a technical school; and that an American forester will miss his calling unless he be a trained modern lumberman, superior in knowledge and hence in efficiency to the lumberman of the past. At Biltmore science is taught with a view to the training of practical workers. The school is a small one, and the students are kept in close personal touch with the instructors.

Travel is an essential means of forest education; travel, however, is not conducive with the student body to systematic study. The Biltmore Forest School gains the advantages and avoids the dangers connected with travel in the following manner: It has established a circuit of five distinct headquarters; and its travels are restricted to the five journeys between them.

Each headquarters is situated in the midst of the woods, and every afternoon is spent in the woods, all lecture work being confined to the forenoon hours. The headquarters are

- (1) The primeval forests of western North Carolina, near Biltmore.
- (2) The primeval forests and cut-over lands near Cadillac, Michigan.
- (3) The national and private forests on the Pacific coast of Oregon near Marshfield.
- (4) The Adirondacks forests near Saranac Lake.
- (5) The German forests near Darmstadt.

Each lecture course is so arranged as to be delivered at that of the five headquarters which offers the best object lessons illustrating the topic treated in the class work.

The course at Biltmore comprises twelve full consecutive months, uninterrupted by any vacations whatsoever. What, indeed, is the need of periodical relaxations for the juvenile mind when the student is permitted to spend every afternoon in the woods? During these twelve consecutive months are offered 620 full lecture hours, of 60 minutes each, on technical forestry. The Biltmore Forest School has its own text books, printed for the benefit of the students, in keeping with all the courses on forestry proper, so as to do away with the necessity of time-taking dictation. The work of the school is hard, concentrated, and intensive. No one should join the school who is not willing to do conscientious work, to the extent of his ability, during twelve consecutive months.

After the lapse of the twelve months at the school—during which the five headquarters are visited alternately—the Biltmore student is placed at a practical test: He is sent to the backwoods and must take a hand in lumbering, logging, and sawmilling during six consecutive months. After proving his efficiency when put to the test in the woods, he is granted his degree of Bachelor of Forestry. A Bachelor of Forestry who has been engaged for at least two years in practical forestry and lumbering and who submits a thesis approved by the Biltmore faculty on a forest topic, is eligible for the degree of Forest Engineer.

The school is open to men at least twenty years of age who are either college graduates or graduates of a high school. All candidates for admission must prove a knowledge of mathematics up to plane trigonometry.

The mental friction taking place at the Biltmore Forest School between the "high school men," many of whom have had some practical experience in lumbering, and the "college men," who are usually devoid of such experience, has proven to be particularly productive of good results.

A student may enter at the beginning of any of the principal courses at any of the five headquarters where such courses are given. The various courses are given in rotation, and the student remains until he completes the entire circuit. A newcomer is benefited by the more mature experience of the senior, and the senior is benefited by the many queries which the newcomer asks of him during the field work.

Applicants for admission are advised of the dates at which a vacancy occurs in the Biltmore ranks. The name of the successful applicant for admission is placed on the so-called "waiting list" opposite the date of his admission.

The expenses necessarily incurred by the Biltmore student living economically during his twelve months' attendance at the school amount to \$1,100. The school's permanent address is Biltmore, N. C., regardless of the headquarters within the circuit which the school is occupying at a given date.

NOTE.—The activities of this school in Germany were the subject of an article and numerous pictures in *AMERICAN FORESTRY* for June and August, 1910.

EDITORIAL

TWO CONVENTIONS

THE Third National Conservation Congress gave evidence by its composition and the seriousness of its work that the movement it represents is growing to maturity. There was a notable absence of the political clap-trap which seems to be regarded by the daily press as material for space and headlines. Workers and experts were much in evidence in the membership of the congress and the practical problems of conservation were approached with a view to their solution. Great credit is due to President Wallace and his associates on the executive board for giving this direction to the work of a convention which might so easily have been made a vent for the discussion of irrelevant issues. There will be a new interest in the work of the congress because of what was done and what was avoided at Kansas City, and it is safe to say that J. B. White, the next president of the congress, will continue this policy of useful service.

It is refreshing to have had this congress held without an outbreak of the wordy and useless warfare over state rights. So far as it applies to the problems of conservation, this issue is dead. We do not mean that all the details of the relation between state and nation in dealing with natural resources are finally adjusted. There are always likely to be open questions of this kind as new conditions arise. Nevertheless, the state rights idea, as some of our western friends uphold it, is dead, and a prompt recognition of that fact will be greatly to the advantage of the country. Now that we know something of the problem of future population that we have to face, and of the growing scarcity of those natural resources upon which the general prosperity depends, it is unthinkable that the nation will turn over its birthright to states or to groups of individuals. If there are phosphate beds in one state, shall they be handed over to the profit of a group of individuals when the agricultural lands of the whole nation are needing this essential element of soil fertility to maintain an agriculture that shall feed a great population which certainly will not have its center in that state? This is an illustration which may be extended through the whole list of non-renewable resources, and the same broad principle covers the renewable resources.

Certain western men of somewhat narrow vision see only in those things that are within their borders wealth pertaining to the state itself, and they wish to have full control of them. This view is a very natural one, but, as we have said, narrow. The western states wherein this feeling finds expression are the outgrowth of a common heritage of the American people. The interests and destiny of the Pacific coast, the Atlantic seaboard, the central valley, the plains, and the country of the big mountains, are bound together by history, sentiment and intimate business connections. The physiography of the United States unites its people as that of Europe divides the nations. Under these circumstances the solution of our difficulties and of differences as between states or sections lies not in the advocacy of discredited theories of political administration, but in getting together through mutual understanding and co-operation upon the common ground of nationality in which each

state shall play its part in the direction of its own domestic affairs. It was decided several years ago by a court from whose decision there is no appeal, which set a final seal upon the work of John Marshall and his associates, that even the original states are not independent and sovereign, but that sovereignty resides in the nation. The states west of the Alleghenies, organized, chartered and settled by the original thirteen were the bond and guarantee of that nationality. The principles of national conservation rest on this foundation.

There was another convention last month in Denver, the so-called Public Lands convention, where this outgrown political idea which was taboo at Kansas City had full swing. This Denver meeting was simply an attempt to set back the clock of national development,—a task impossible. United effort of the whole people to conserve the natural resources of the country for the common good is the only safeguard for continued prosperity of the American people.

A SILENCE BROKEN

THE recent Secretary of the Interior made a remarkable address at Denver last month, remarkable from its savage personal note and, coming from a former administrative officer of the government, for its failure to discriminate between the functions of legislative bodies and administrative bureaus. That there are abuses of bureau power is unquestionable. Bureau officials are human and liable to human errors, and among them is that ancient failing of man who is "dressed in a little brief authority." We have had occasion of late to criticise the adherence to the letter rather than the spirit by one of our most useful scientific bureaus, but we would not on that account abolish the Geological Survey and turn its highly specialized scientific work over to those whom Mr. Ballinger vaguely describes as the people's representatives. In fact, we are inclined to think that if the people's representatives had steered a straighter course in harmony with the people's will, the case which has aroused the criticism referred to would have been settled in a better way for all concerned.

Mr. Ballinger criticises the practice of investing certain bureaus with the power of making rules and regulations having the effect of law as being tantamount to the substitution of the bureau chief for the law maker. It may again be admitted that abuses can arise under such a system, but when there are large affairs to administer, what shall we do about it? Congress cannot direct the details of all the countless administrative functions of the government. The people's representatives have their hands full now. Some power must be given to public servants employed under authority of Congress, and it should be borne in mind that such servants are always subject to the control and direction of the people's representatives in Congress. If their methods are bad, they can be changed by authority of law. Of course, the answer from the gentlemen with whom the ex-secretary has allied himself, is that the national property should be given up to the state. But this, as we have said elsewhere, is a dead issue. The people of this country will not hand over their national birthright to be administered by a group in which they are not represented. To do so would be to run counter to the strongest point embodied in Mr. Ballinger's argument.

The animus of the ex-secretary's argument is directed against the Forest Service, as was shown by the climax in which he denounced what he calls the most gigantic political scheme ever attempted in the history of the republic,

the alleged attempt to "dismember the Interior Department by taking from it all those bureaus that had anything to do with the public domain, and, together with the forestry bureau, concentrate them in another department where their combined strength would be utilized to promote propaganda designed to operate the public domain as a national estate for the conservation of certain bureau chiefs." The only comment that needs to be made on this amazing charge is that it is childish. If Congress should see fit to change the organization of the Interior Department or any other department of the government, as it has heretofore done, in the interests of a more logical arrangement, we do not know of any particular sanctity attaching to the present organization of any of the departments which should stand in the way of such action. Such action would have to be the action of the representatives of the people whom Mr. Ballinger believes should dictate in all these matters.

On the whole, it does not seem to us that the ex-secretary has strengthened himself by the illogical and splenetic manner in which he has broken silence.

EUROPE AND AMERICA—A COMPARISON

IN A RECENT number of the *American Lumberman*, Mr. Charles Willis Ward, of Michigan, makes a very clear and detailed comparison between the conditions and opportunities of forestry in Europe and America. The points made by Mr. Ward are familiar in discussions of foreign and home forestry but he has arrayed them in a systematic way which presents the case interestingly and comprehensively to the general reader. He mentions among the advantages enjoyed by the European forester the long establishment of forestry in Europe upon a business basis; the supply of trained and experienced foresters and the abundance of skilled labor at a labor cost less than in the United States; the high standing of forestry as a profession; the freedom of forestry from professional politics and the greater ease in securing funds to carry out public forestry work; the better system of taxation of forest lands in vogue in Europe; the existence of a market for all forest products including some that are waste in American forests, although Mr. Ward believes that this objection will soon be largely removed in the United States; and finally the scarcity of large coal deposits and absence of mineral oils and gases which tend to hold the value of wood for fuel purposes at a comparatively high rate.

On the other hand, the European forester works under the disadvantage of a scarcity of low-priced land available for forestry use and the high cost of food products which maintains the permanently high value of agricultural land and renders remote any prospect of a reduction in the future cost of land needed for new forests.

The American forester has these advantages, as Mr. Ward points out: An abundance of cheap land available for forestry use; the existence of large tracts of virgin forests containing heavy stands of natural timber which may be subjected to permanent forestry treatment; an abundance of low-priced agricultural lands which will for some time tend to maintain a comparatively low value of food supply; less competition from substitutes for wood in building materials and a wider market and more active demand for staple forest products; the introduction of iron and steel in structural work of large buildings maintaining a constant demand and increasing values for better grades of finishing wood; and, finally, the enormous railroad mileage requiring

the use of wood for railroad ties and their renewal to such an extent that extensive forests must be maintained to supply material for this purpose alone.

These are all practical economic considerations which any man can understand and when the balance is struck it can be seen that forestry in this country is not so much at a disadvantage in comparison with Europe as we sometimes assume.

AN ESSENTIAL DIFFERENCE

VICE PRESIDENT SHERMAN has a national reputation for a cheerful and almost irresponsible optimism. In a recent speech which is receiving considerable attention because of its antagonism to the views of the duty of one generation to the next which are fortunately gaining ground among us, he is quoted as saying that he is the best conservationist who utilizes the forces of the air and all the different forces of the earth for the advancement of mankind and turns them into comfort and conveniences and makes them supply necessities and in other ways lessens the burdens of this generation; and further "I believe each new generation is equal to the task of discovering some new thing to take the place of any existing natural resources. I am willing to give the coming generation credit for being as smart as we. I believe that they will find fuel."

This is sublime optimism in view of what we know of reckless waste and destruction in our management of the natural resources of the earth. Unfortunately it runs counter to established fact. We believe with Mr. Sherman that every resource which nature has provided should be utilized to the utmost for the welfare of mankind. We believe that the coming generations will be amply capable of handling their own problems, but we also believe, and upon this point Mr. Sherman seems to be indifferent, that as managers and workers in this great producing plant, we should leave it in good working condition,—not stripped and damaged through wasteful use and improvidence; that we are trustees and should not impair the working capital of the world.

This we regard as a fair interpretation of what is generally known as conservation,—a term too little understood and hence too often irrelevantly criticised. To translate this idea into the field of forestry, which is typical: we must utilize our forests to the full measure of their productivity, but we must not impair that productivity, as others will come after us who will need the forests as much as we.

It will be seen that while Mr. Sherman's position is right as far as it goes, he omits a very essential consideration which we as responsible human beings with a debt to the past and a responsibility to the future cannot ignore.

A PERSONAL WORD

ON THE first of November Edwin A. Start retires from the secretaryship of the American Forestry Association and the editorship of *AMERICAN FORESTRY*, and he wishes to take this opportunity to express to many friends his grateful appreciation of the support they have accorded to him during the two years that he has been the executive officer of the Association.

The advance of forestry makes the work of such an association as this of increasing importance and defines its functions and its opportunities with

greater definiteness than in the early years of general propaganda. Successful forestry must rest upon a firm foundation of popular understanding and broad cooperation, and the American Forestry Association is the necessary link that unites the professional foresters and the great body of laymen. Its work of education and organization will be needed for many years, and the retiring secretary urges, out of his experience and knowledge, a continued, increased and revitalized support of the Association by the American public for whose interest alone it exists.

NATIONAL FOREST WORK

Relief for Homesteaders

Settlers on national forests under the act of June 11, 1906, will no longer have to pay for a survey, as they have had to do in the past on unsurveyed lands, when the claim goes to patent. This relieves many settlers under the act, commonly known as the forest homestead law, from a burdensome expense. Relief from this burden has been brought about by an agreement between the Secretary of the Interior and the Secretary of Agriculture, whereby surveys made by employees of the Forest Service will be under the supervision of the Surveyor General so that they can be accepted by the General Land Office as final.

Hitherto it has been necessary to make two surveys. Under the terms of the forest homestead law, national forest land cannot be opened to settlement unless the Secretary of Agriculture has recommended to the Secretary of the Interior that it be listed for settlement; and listing is not possible until a survey has been made. The Secretary of Agriculture has no authority to list any land unless an examination has shown that the land is more suitable for agriculture than for forest purposes. So when land is applied for, employees of the Department of Agriculture are sent to ascertain its character, and at the same time make a survey of it by metes and bounds if a survey is necessary.

This survey, however, could not be accepted by the land department as a basis for patent, because only surveys under the supervision of the Surveyor General can, under the law, be accepted as a basis for passing title. In consequence, under the procedure provided for when patent is sought to unsurveyed lands, the settler on land within a national forest has had to pay for a second survey. This has been felt to be especially hard because it has subjected settlers on national forests to an expense which settlers on surveyed public lands do not have to bear. Since it merely duplicated the work of the first survey, there seemed no reason why this first survey might not answer both for listing the land and for patenting it.

The survey for listing, made by forest officers, has always been without expense to the prospective homesteader. Under the new arrangement, the field expenses of the survey will continue to be paid by the Department of Agriculture, so that the applicant will merely be called on to meet the cost of checking up and platting the surveys by the Surveyor General. This will remove one of the greatest objections to the working of the forest homestead law. The officials of both the Department of Agriculture and the Department of the Interior are pleased that the way has been found, through co-operation in the surveys, to simplify the procedure, cut out a duplication of work, and lessen the cost of settling upon agricultural lands within national forests.

The Appalachian National Forest

The work of examination of lands for purchase for national forests in the Appalachian Mountains is in progress and data is being gathered for submission later to the commission, which will probably meet soon after the reassembling of Congress. The report of the Geological Survey on the White Mountain lands will not be made until spring. Experiments are in progress from which the experts of the Survey expect to obtain definite scientific data which will be conclusive from the point of view which they have adopted as to the effect of forest cover upon streamflow on the White Mountain watersheds. The report has been postponed to await the result of these experiments, but is promised in the spring in time for action before the close of the current fiscal year.

The price at which some of the White Mountain lands are held may stand in the way of their purchase by the government. These prices in some cases are higher than the government can pay and unless the owners will meet the government half-way, their attitude may be an obstacle in the way of the accomplishment of this great public improvement.

CURRENT LITERATURE

REVIEWS

The Development of British Forestry. By A. C. Forbes, F. H. A. S., chief forestry inspector to the Department of Agriculture for Ireland: Illustrated. pp. xi, 274. New York: Longmans, Green & Co.; London: Edward Arnold, 1910.

In his preface the author expresses the belief that "British forestry, after lying almost dormant for about five hundred years, is really developing at last." The book is an attempt "to present a general review of the whole problem of afforestation as it must appear to the landowner and the practical forester." It will be noted that afforestation, or reforestation, is the aspect in which forestry largely appears under British conditions. The elaborate report of the royal commission on coast erosion will be recalled as a further indication of this. Mr. Forbes, the author of the present volume, is known as the author of a book on "British Estate Forestry," published a few years ago, which has had readers among those interested in forestry in this country.

In his opening chapter the author brings out the natural connection between mountain and forest, and also makes a pregnant suggestion in pointing out that the lack of forests in the British Isles is in large measure due to alienation of land to private proprietorship, while on the continent, when the need of forest preservation became evident, large tracts still were controlled by state, crown, church or commune, or "possibilities existed of resuming possession of them on easy terms." This historic fact suggests that we have begun none too soon to reserve our government forest lands, and it may be added that we have already experienced the difficulty of resuming public ownership of what has once been alienated. It is being recognized throughout Europe, Mr. Forbes concludes, "that private enterprise will not or cannot maintain a supply of timber which will meet the needs of modern civilization." These and other generalizations Mr. Forbes supports with facts and figures.

He next takes up the forest requirements of the United Kingdom. He finds that estimating at 3,000,000 the present timber-bearing acreage, an addition of 4,000,000 acres is needed for economic timber growing and must be taken from the agricultural and grazing land. This may be compared with the estimates of the royal

commission previously referred to, a report by the way which Mr. Forbes regards as financially unsound. The relation of agriculture to forestry development is the theme of the third chapter and here we find reflected the opinion applied on the continent and generally growing abroad that more or less fairly good land can and should be applied to economic forestry, and that forest planting should not be done upon land that will not produce profitable results.

The relations of climate and tree growth form the subject of another chapter, followed by one on soil and surface conditions in the British Isles. The sixth chapter deals with the need for improved methods and practice in British forestry. In this connection the author points out three features of British as compared with continental forestry: (1) the small size of British woods; (2) their mixed or indefinite character; and (3) their lack of density, deficient yield during their early and middle stages of development, and the low quality of their matured timber. This is surely a sufficient basis for suggestions for improvement. A natural sequence of this is a chapter on the economic value of the British forest flora. Some financial aspects of British forestry are considered and several tables showing British and continental yields accompany this chapter.

The last chapter treats of the problem of the state and private owners. The author has evidently given much thought to this topic and his views, while relating especially to British conditions, have in many respects general application. They are carefully and conservatively formed. Mr. Forbes believes in the necessity of private ownership of small woodlands and close co-operation between the state and the individual in forest management. One of his criticisms of the royal commission's afforestation report is that it ignores this necessity and assumes that the state can entirely take the place of the individual owner.

Comprehensive examinations like this of a national forest problem in its various phases are valuable not only in their own country, but for comparison in other countries. This book is well reasoned, well written, and well illustrated. It is comparatively free from difficult technicality and can be studied by the layman with profit.

Land Problems and National Welfare. By Christopher Turnor, with an introduction by the Right Hon. Viscount Milner, G. C. B., G. C. M. G., etc. pp. xvii, 344. London: John Lane, the Bodley Head; New York: John Lane Company, 1911. Price, \$2.50 net.

This is a thoughtful study of land problems as the basis of social economics, and political reforms. Its author is a landowner, who, says Lord Milner in his introduction, "combines with practical knowledge of agriculture a high sense of the duties of his position, and, what is perhaps more uncommon, a keen sympathy with the farmer and the laborer." Mr. Turnor in his own preface quotes at length from the report of the Roosevelt country life commission, saying that its conclusions are applicable in England and "form an excellent preface to the whole subject of rural development." It may be said in return that while this volume applies to English conditions which differ so materially in many ways from ours, there is much in it that is worth the attention of our American students of rural development. Indeed we find that so far as the economic and practical conditions of agriculture are concerned this book might almost have been written for an American audience. It treats successively of the landowner, the farmer, the rural laborer, education and agriculture, political economy and the land, small holdings and agriculture, agricultural organizations, politics and the land, the land and the empire. In view of the present acuteness of the forestry problem in England and the opinion advanced on excellent authority that some millions of acres of indifferent agricultural land should be utilized for reforestation, it is disappointing to find so broad and intelligent a student of conditions as Mr. Turnor ignoring this side of the land question altogether.

Woodworking Safeguards for the Prevention of Accidents in Lumbering and Woodworking Industries. By David Van Schaack. Aetna Life Insurance Company, Accident and Liability Department. Hartford, Conn., 1911. pp. 217. Price, \$1.00.

The Aetna Company has done a good service in publishing this volume. Appliances of wide variety for safeguarding workmen from the logging plant through the various factories are described and illustrated with numerous pictures designed to make their point with great clearness. The author does not claim that he has included all patented or home-made safety devices in use in the woodworking industries, but this survey of the field is very comprehensive, nevertheless. We are having it brought home to us that we Americans must be more regardful of human life

and limb and not think solely of the machine and the product. The wood producing and working industries are in the dangerous class and should be safeguarded in every possible way.

Trees and How to Know Them. A Manual with Analytical and Dichotomous Keys of the Principal Forest Trees of the South. By W. A. Lambeth, M.D., Ph.D., Professor of Field Botany in the Summer School of the University of Virginia. pp. 52. Atlanta, Richmond, Dallas: B. F. Johnson Publishing Company, 1911.

A key for the identification of species with brief descriptions of leaves, flower clusters, and fruits, and a glossary of botanical terms. The south is less well supplied than the north with such instruments for local tree study and this will probably be serviceable. It includes the common trees of the south, both indigenous and introduced. Emphasis is placed upon the leaves, as being easiest for the beginner.

Ornamental Shrubs of the United States (hardy, cultivated). By Austin Craig Apgar. pp. 352. New York: American Book Company, 1910.

This little manual by the well known author of "Trees of the Northern United States" was completed by Professor Apgar just before his death and edited by his daughter. It is intended for the use of those who are not botanists but who wish to know by name the shrubs to be seen in parks and private grounds. For its purpose it is convenient and well arranged. Its main parts are three: leaves, flowers and fruit; keys to the genera; and descriptions of the shrubs. There is a glossary and index. The illustrations are from the author's sketches.

The Forests of the Philippines

A bulletin on "The Forests of the Philippines" has just been issued by the Philippine Bureau of Forestry under the direction of Major George P. Ahern. The author is Dr. H. N. Whitford, chief of the division of investigation, who, in a course of studies extending for several years and covering practically all accessible portions of the archipelago, has gathered together and embodied in this bulletin the most complete and authentic discussion of the subject which has yet been prepared. The book will be found of great value by all who are interested in the forests of the Philippines and their products, whether the point of view be that of a scientist, a business man, or a lover of nature. In many respects the forests of the Philippines are among the most varied and wonderful in the world, and now almost for the

first time there is given the layman an opportunity to learn how to know and to appreciate them.

The bulletin is published in two parts. Part I gives a discussion of the general type of vegetation with estimates of the extent of the virgin forest, second growth forest, grass lands and cultivated areas. The forests themselves are discussed under twelve separate types, five of which are known as the Dipterocarp types, comprising seventy-five per centum of the entire area of the virgin forest and forming the bulk of the timber manufactured in the islands. The Molave, Mangrove, Beach and Mossy types are treated more briefly and a discussion of their economic importance is also included.

Under the general heading of "Wood Uses" is given a brief discussion of the kinds of wood employed for different purposes, such as house construction, piling, wharf building, railroad ties, etc. "Lumbering in the Philippines" is another heading. It contains a discussion of the market, logging and milling operations, transportation and labor. Dr. Whitford estimates the annual cut of timber at eighty-eight million board feet. The number of steam sawmills has increased from thirty-one in 1907 to sixty in present operation. Under "Minor Forest Products" are discussed such subjects as fuel, resins, oil, gutta percha, almaciga, rubber, etc. An exceedingly valuable feature of the bulletin is a number of diagrams showing from just what sources all of these minor products are derived. For instance, on page fifty-seven is a table showing the sources of wild and cultivated gutta percha and rubber, including all of the trees in the islands from which these two products may be obtained. There is also a chapter of the bulletin devoted to a discussion of the relation of the government to the forests and their products; here is shown by diagram how the government disposes of the forest products and what the charges are. How long-term exclusive licenses, or "concessions," may be obtained is also fully discussed. Part I is illustrated with twenty-eight full page plates which add greatly to its usefulness.

Part II treats of the "Principal Forest Trees." Non-technical descriptions are given of one hundred and six trees which include all of the principal timber species whose lumber is of importance in the commercial markets. Brief mention is made of some two hundred and seventy-seven other trees of the Islands that are found in the forests or else are cultivated for ornament or for fruit. This part of the bulletin contains one hundred and three illustrations showing the bark, leaf and wood characteristics of the principal species.

This bulletin is not for free distribution, but is sold at a price of \$1.25 per copy,

postage prepaid. All requests should be addressed to the Director of Forestry, Manila, P. I., remittance being made only by postal money order.

MONTHLY LIST FOR OCTOBER, 1911

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EDUCATION

Ranger Course at Colorado School of Forestry

Announcement is made by the Colorado School of Forestry of a ten weeks' ranger course to begin December 13, 1911. The aim of the course is to give in a limited time as much instruction as possible in forestry and related subjects to those who are interested or are actually engaged in forest ranger work. Until January 1, the course will consist of lectures at Colorado Springs. After that date the instruction will be transferred to the school's reserve at Manitou Park, twenty-five miles west of Colorado Springs. The lectures will be given by the faculty of the school of forestry, by members of the faculty of Colorado College, of which the school is a department, and by the Forest Service. They will comprise discussion of the fundamental principles of silviculture and forest administration, forest law, grazing problems, construction of roads, trails, telephone lines, cabins, etc., diseases of trees and forest entomology, identification of the more important woods and trees, and other subjects of practical value to the ranger or woodsman. The course includes also lectures on general botany, geology, and first aid to the injured. It provides instruction in mechanical drawing suitable to the preparation of forest maps, mathematics, and some other elementary subjects.

The field work at Manitou Park will be conducted by the faculty of the School of Forestry. It will consist of practice in surveying, estimating, forest mapping and description, preparation of volume and growth tables, marking of trees for cutting, study of lumbering at the school's mill, instruction in packing, horseshoeing, etc.

Information concerning the course may

be obtained from Philip T. Coolidge, Director, Colorado School of Forestry, Colorado Springs.

The University of Missouri

Instruction in the elementary principles, history and economics of forestry, has been given in the University of Missouri for over five years. It was not, however, until 1910 that a demand for a forest education of a more professional nature was believed to exist. In that year a department of forestry was created in the College of Agriculture. The work of instruction actually began this fall with four juniors and several sophomores and freshmen enrolled in the four years' course.

The many forest schools that have been established in recent years have been located in the northern and western states, with the exception of the department of forestry in the University of Georgia. It had been felt for some time that there should be a Forest School established to satisfy the demand of students from the southern and southwestern states who seek a training in the profession of forestry.

The location of a forest school in the state of Missouri is an ideal one. Situated on a plateau 600 feet above the sea level and 30 miles from the Missouri River, the university contains within its own campus natural examples of the southern hardwood forests along the bottomlands of the creeks emptying into the Missouri River, and in the higher lands on the plateau is found the flora of the northern states. It is the meeting ground of northern and southern species. To the south lie the Ozark Mountains where the university owns over 50,000 acres of timbered land, the woods laboratory of the forest school.

Here are found many types of trees, from the pine lands and upland hardwoods to the swampy conditions of the Mississippi bottomlands. To the north lie the prairies and to the west the great plains each with its particular forest problem.

Located in the College of Agriculture, the forest school will have the advantages that forest schools in similar land grant colleges possess, of having the fundamental sciences taught in long established departments of the university, and of calling on the other colleges for instruction in such subjects as surveying, engineering, entomology, economics, etc.

Twelve weeks of the course will be spent in practical forest work in the Ozark Mountains on the university forest. Here the work will consist in estimating timber, investigating lumber operations, making topographic and logging maps, and in marking timber for cutting. It is planned to acquire a portable sawmill so that the students can make studies of the different processes of a small sawmill operation and become proficient in the handling of such mills and in the manufacture of lumber.

At Columbia a twenty-acre tract of young timber has been devoted to the use of the department of forestry as an experimental and demonstration tract, and several acres laid out for a forestry nursery. The university owns many planted groves of forest trees such as catalpa, black and honey locust, hackberry, ash, pecan, etc.

One of the latest of the forest schools to be established, the University of Missouri Forest School already has a woods equipment unsurpassed by any other. The course will be developed along practical lines, fitting students for professional forest work.

Harvard Forest School

In the September number of this magazine, in a list of institutions giving instruction in forestry, the forest school of Harvard University was listed with the undergraduate schools, its course being described as a four years course in forestry in the Lawrence Scientific School for the degree of B. S. in forestry. In the same list the school was properly treated as a graduate school with a two years graduate course. It should not have been included in the undergraduate list. The Lawrence Scientific School has been out of existence for three years and no course in forestry is given in Harvard to undergraduates. The course in the Harvard graduate school leads to the degree of M. F. and the school is in the same class with the graduate schools of Yale University and the University of Michigan. The list published in September was furnished by the Forest Service and published without correction. The Harvard Forest School was properly listed in AMERICAN FORESTRY's own list published in December, 1910.



STATE WORK

The Chestnut Bark Disease

The Pennsylvania legislature at its last session enacted a law providing for a commission to investigate and combat the chestnut blight, and appropriating \$25,000 for the expenses of the commission, whose members are to serve without pay, and a further sum of \$250,000, available on approval of the governor, for the performance of the duties required. The commission is made up of Winthrop Sargent, chairman; Harold Pierce, secretary; T. N. Ely, Samuel T. Bodine, and George F. Craig. The commission has opened headquarters in Philadelphia and engaged as its forester S. P. Detwiler, assistant professor of forestry in the University of Minnesota. In a detailed account of the work thus far done in the state, published in *Science*, September 29, Deputy Commissioner of Forestry Williams says: "In order that valuable time might not be lost while the organization was being perfected, the Department of Forestry of the state organized the outside work by sending men first to an instruction camp and then starting them out as scouts in lower York County, to locate infection and report on its prevalence.

Reports from these parties are now being received daily. With additional parties organized, York County will soon be covered and the work will then continue up the west side of the Susquehanna River and westward along the Maryland line. A large amount of preliminary work will be done this year in the hope that the winter work of taking down infected trees may accomplish the desired end, preventing further westward spread of the infection."

In Massachusetts the disease has been studied by Arthur H. Graves, a United States government expert, who says in his report to the state forester:

"The chestnut bark blight has been found in seventy Massachusetts towns. The disease appears to be more general in the south-central and southwestern parts of the state. This is perhaps due to the fact, that these portions are nearer to the badly infested regions in New York and Connecticut, and possibly also because on the whole more chestnut occurs here than in other parts of the state. In the southern part of Berkshire county the disease has already done a great deal of damage. There is every reason to believe that if the disease continues to spread as it has within

the last half dozen years, it will ultimately cause tremendous havoc in Massachusetts, as it has already done in New York, New Jersey and Connecticut." Supplementing the report of Prof. Graves, Prof. Metcalf, pathologist in charge of the bureau of plant industry, U. S. Department of Agriculture, writes State Forester Rane that "during the past summer the disease has spread more than in all its previous history. Whatever is done in Massachusetts, as well as in every other state north of Virginia, must be done within the next year. Otherwise we definitely face the issue of the extinction of the chestnut tree."

The methods of control already adopted in New York and Pennsylvania are the only practical methods that we know of controlling the disease. These methods are, briefly, the location and destruction of the small advance infestations beginning in that part of the state farthest away from the center of infestation. We cannot too strongly advise the eradication as soon as possible of all advance infestation of this disease in Massachusetts, beginning in the eastern part of the state. It is probably already too late to save the southwestern part of the state by any method."

An illustrated bulletin on the disease for the information of the public has been issued by the state forester.

In this connection the following communication to *AMERICAN FORESTRY* from Mr. T. L. Hoover of New York is of interest, as it offers a theory of a possible underlying cause of the development of this disease:

"Never before in the annals of forestry has disease wrought such havoc with any species as has the chestnut-tree blight. On Long Island, and in western Connecticut, southern New York, and New Jersey the scourge has utterly devastated the chestnut forests. And the last Pennsylvania legislature manifested its concern over the situation by appropriating one-quarter million dollars to investigate and combat this fatal and progressive disease.

While the origin of the infection is a mystery, and although its remedy remains undiscovered, certain well known facts suggest some reason for the complete and overwhelming fatality of the blight. It is significant that the habitat of the chestnut along the Atlantic seaboard is co-extensive with the earliest settled parts of America. Thus from colonial times the species in-

vited destruction, commending itself, as it does, to man's use through the many distinctively admirable qualities of its wood. And not alone the standing timber, but the succeeding generations were endangered through the popularity of its edible fruit. So complete has been the consumption of chestnuts that the species, deprived of opportunity for natural regeneration, must have been doomed long since, were it not for the remarkable faculty of producing sprout growth from the stump. Fortunately the chestnut possesses the power of coppicing to a degree far beyond most other trees.

The inevitable result—as is evident to every careful observer—is that the present-day stand of chestnut consists of about ninety per cent coppice (not merely second, but third and fourth growth), a small number of aged giants—ancient survivors of the primeval forest—and only a negligible quantity of seedling trees.

But the power of coppicing, unfortunately, is a diminishing one, exhaustive of the tree's vitality and at length fatal. A forest composed of members, either aged and failing or else with vitality depleted and vigor impaired by ill-treatment, can offer little resistance to a malignant foe. Admitting, on the one hand, such a forest condition, and presupposing, on the other hand, the existence of an infectious disease, and one comprehends the awful ravages to be witnessed wherever the blight has spread.

Whatever success we may have in curbing the present epidemic, one lesson stands forth clearly: *the viciousness of the old method of successive and excessive coppicing*, practiced and handed down by our forefathers. *There remains to devise a correct silvicultural system for the chestnut*, if we hope to save and maintain the species in the future. For verily, the iniquities of our fathers have been visited upon the chestnut and upon us unto the third and fourth generation."

Massachusetts

Under legislation passed during the last session the fire protection work of the Massachusetts forest service has been greatly strengthened. An expert state fire warden has been added to the state forester's staff and will give constant attention to the equipment, organization, and training of the forest wardens of the towns. A patrol system has been inaugu-

rated under the co-operative clause of the Weeks law. A system of fifteen observation towers has been planned to cover the whole state and nine or ten of these have already been put in use. They have telephone connections, and one of them, on Mount Wachusett, in the central part of the state, has demonstrated its usefulness already by the prompt reporting, resulting in the prompt extinguishing of thirty fires within a few weeks after its establishment. M. C. Hutchins, who acquired his experience in New York state in active service, is in charge of this part of the Massachusetts forestry work.

New Hampshire

Under a co-operative agreement between the state and the United States Department of Agriculture an exhaustive study of the wood-using industries of New Hampshire will be made. The work will be in charge of agents of the Forest Service, and more than 700 New Hampshire manufacturers who use wood have been asked to furnish information. The major part of the timber cut in New Hampshire is used for general construction and for laths, railroad ties, poles, mine props, bridge timbers, and fence posts, but in addition a large quantity goes to meet the demands of the wood-using factories which convert material into commodities of many uses and many kinds. It is these factories which are to be studied in the New Hampshire investigation. Similar studies have been completed for other states—Massachusetts, Kentucky, Illinois, Maryland, North Carolina, and Wisconsin. One point which will be brought out by this study is the extent to which the forests of New Hampshire or outside sources produce the woods used by the manufacturers. In 1909 New Hampshire stood twenty-fourth among the lumber-producing states, but among the New England states it stood next to Maine. It is probable that New Hampshire holds a more important rank as a user of wood than it does in production.

The supreme court of the state has decided that the law for the purchase of the Crawford Notch by the state was invalidated by the technical error through which Governor Bass signed the bill without the amendment as it passed the legislature. This prevents action by the state until another legislature can convene and repass the measure.

NEWS AND NOTES

The Third National Conservation Congress

Nearly twelve hundred delegates attended the sessions of the Third National Conservation Congress at Kansas City, September 25, 26 and 27. Since the first preliminary gathering in Washington, probably no conservation assembly has adhered more strictly to the line of actual conservation than this one. President Wallace had made it very clear in advance that the disappointments of the Saint Paul meeting were not to be repeated.

Quite naturally with so distinguished a leader of agricultural development at the head of the congress, the key-note of these meetings was the conservation of the soil. This was struck in an able address at the opening session by President Wallace, and it was followed by a number of speakers. Together with this the improvement of country life, along the lines indicated by the country life commission, was considered as a necessary adjunct to the development of agriculture along the best and highest lines.

The program was not crowded as so many programs of similar gatherings in years past have been with speakers of political prominence, although there were on the program such men of national note as President Taft, Mr. Bryan, Dr. Wiley, Secretary Fisher and Judge Lindsay.

The President confined his address strictly to the subject of agricultural development and did not introduce any of the moot public questions of the hour. An able address by Captain J. B. White on the third day of the congress dealt with practical forestry in Europe and America.

An amendment was adopted at one of the sessions of the congress giving all national associations which have conservation committees a member on the advisory board of the congress. This would include such organizations as the National Association of Manufacturers, the National Board of Trade, the Daughters of the American Revolution, and the Federation of Labor. Another amendment proposed by J. B. White as a result of Judge Lindsay's address in behalf of the child included conservation of human life in the objects of the congress.

The resolutions of the congress recommended the early opening of the coal fields of Alaska on a leasing system, the fields to remain under national ownership until

such times as states may be created in that portion of our territory; the enlargement of the powers of the Interstate Commerce Commission for further supervision of railway business; the establishment of a parcels post; the development of inland waterways; the movement looking toward the safeguarding of the national health; and a system of free schools which should be organized and conducted so that the great purpose for which the congress exists will be realized through the work and lives of men and women trained in health, home-making citizenship and industry. The resolutions referring to forestry and the public lands were as follows:

FORESTRY AND LANDS.

"We commend the efficient work of the federal forest service, and particularly urge upon Congress the need for more liberal financial provision for protection of the national forests from fire, and the desirability of making the army available without delay whenever needed to supplement such protection.

"We also appreciate the forestry progress being made by many states, believing it not only the function but the duty of the state to safeguard its forest resources by liberal appropriation for fire prevention; by acquisition and conservative management of state-owned forest lands; by encouraging the practice of private forestry on timberlands and wood lots in every way, especially through reform in forest taxation, and by providing for the educational work necessary to secure all these ends.

"We commend the increasing effort at better forest management and protection by timber owners themselves, and urge upon all such the study and emulation of the several co-operative systems for this purpose.

"We urge the co-operation of public and private educational authorities in instilling the principles of forest economics in the minds of the young of today, who will be the doers of tomorrow.

"The public lands should be safeguarded from losses through natural agencies and negligent or thriftless use; that they should be so cultivated and improved that they may pass to each coming generation with increased fertility and productivity and that they should forever be used as sites for homes in which the strength and spirit

of the nation may be conserved for the general welfare of mankind.

"Approving the withdrawal of public lands pending classification and the separation of surface rights from mineral, forest and water rights, including water power sites, we recommend legislation for the classification and leasing for grazing purposes of all unreserved lands suitable chiefly for this purpose, subject to the rights of homesteads and settlers or the acquisition thereof under the land laws of the United States, and we hold that arid and non-irrigable public grazing lands should be administered by the government in the interest of small stockmen and homeseekers until they have passed into the possession of actual settlers.

"We favor the repeal of the commutation clause of the homestead law and the disallowance of homestead entries of land chiefly valuable for its timber at time of filing.

"We hold that mineral deposits underlying public lands should be transferred to private ownership only by long time lease with revaluation at stated periods, such leases to be in amounts and subject to such regulations as to prevent monopoly and needless waste, and that in case of doubt as to the availability of such mineral deposits, or while they are awaiting exploitation, surface rights to the land should be transferred only by lease under such conditions as to promote development and protect the public interest.

"We hold that phosphate deposits underlying the public lands should be safeguarded for the American people by appropriate legislation, and that export of phosphates and other natural or manufactured material should be limited and regulated by law.

"Realizing that the productivity of our soil depends upon water supply; that one of the chief losses of the farm is destructive soil erosion; that the freshets and floods due to storm and thaw waters are destructive to property and even of life; and knowing through experience in this and other countries that the waste and destruction due to unregulated runoff are largely susceptible to control by appropriate agricultural methods, we hold that the aim of every farmer should be to make his farm take care of the water naturally reaching it."

Officers were elected as follows: President, J. B. White, Kansas City; executive secretary, Thomas K. Shipp, Washington; treasurer, D. Austin Latchaw, Kansas City; recording secretary, James C. Gipe, Clarks, La.

North Carolina Forestry Association

At a meeting of the officers and executive committee of the North Carolina Forestry Association September 21, a constitution was adopted for submission to the

annual meeting of the association in January. It was decided for the present to concentrate the efforts of the association towards (a) the reduction in the annual drainage to the forests of the state from fire (b) the prevention of insect depredations in our pine forests, and (c) the introduction of methods of management which will insure adequate reforestation.

With these objects in view it was determined to collect statistics of the annual loss from forest fires in the different counties of the state and have them published separately in the county papers, for the information of the local population. The formation of small local associations in affiliation with the state association will be strongly advocated and encouraged for the purpose of increasing the interest in forest protection and for forming centers for the collection of statistics on forest destruction.

The reforestation of the cut-over and abandoned lands of the state both by natural and artificial means will be strongly urged by the association.

A New American Arboretum

The late William Pryor Letchworth, well known for his large public spirit and many good works, left his noble estate, Glen Iris, at Portage, New York, to the state for a park. The American Scenic and Historical Preservation Society, which is the custodian under the deed of gift, has decided upon a policy that harmonizes well with Mr. Letchworth's interests and the spirit of his gift. The purpose is to make the park a great arboretum. Of this the *Rochester Democrat* says:

The park, which comprises about 1,000 acres, especially adapted to forest growth, will be transformed into an immense arboretum for testing the adaptability of all kinds of forest trees, native and foreign, having in view the necessity of ultimately restoring the forests of this country. The plan has been well devised, and contemplates eventually furnishing material for planting forests of vast extent with trees which have been tried out and which have been found to be best adapted to the varying climatic and other conditions which are found in the United States.

It should be understood at the outset that the plans of the American Scenic and Historical Preservation Society in no wise will militate against, but will enhance, the instruction and pleasure of the people who, in the last analysis, are the owners of the park. It is made plain by Mr. Dow that it is the intention of the Scenic Society to operate the Letchworth Park arboretum on the lines followed at the Glasnevin Royal Botanic Gardens at Dublin, the Arnold arboretum at Boston, and the Highland Park arboretum at Rochester, which is ranked with the two first named

by Sir Frederick Moore, of Glasnevin Gardens, and Dr. Charles S. Sargent, director of the Arnold arboretum.

It requires more than superficial consideration to realize the importance, both to the present generation and to posterity, of planting an experimental forest of 1,000 acres and applying to it, for 100 years and more, the scientific methods adopted at Glasnevin, the Arnold arboretum and the Highland Park botanic gardens. A comparatively few years of trying out of every variety of forest tree adaptable to American soil, and the elimination of undesirable varieties, will enable the authorities almost immediately to bring into activity the functions of the great arboretum as a supply nursery. Thus the Letchworth arboretum will within the short space of a decade become the progenitor of similar arboretums throughout the entire country.

The popular study of shrubs and plants in the Highland Park arboretum has already had its effect in the direction of education. The grounds and yards of the numerous homes which have been established under the shadow of Highland Park are already ornamented with choice trees and shrubs which have been tried out and approved by the expert horticulturists who have charge of the beautiful arboretum at the park.

New England Farmer as a Source of Supply

Economists concerned with the country's timber resources are constantly confronted by the apparent fact that the commonwealth can conserve timber (because it can exempt its own timber from taxation), but conservative forestry is impossible for the tax-paying individual. It appears, however, that, even under the present adverse taxation conservative forestry perhaps may be practiced by the American farmer at a profit. It may be possible, though, only in a well settled country close to a steady local demand.

Investigating the farmer's wood lot as a serious proposition, an editorial representative of the American Lumberman while in Boscawen, N. H., recently found there a concrete example of a farmer's wood lot operated apparently at a profit. Forty years ago George L. Pillsbury, of Boscawen, bought forty acres of land for \$1,000 and set it aside as a wood lot. Even at that date he believed that timber could be made a profitable farm crop. The conditions were somewhat favorable to the success of the experiment, as Mr. Pillsbury was a builder and required native timber in his operations. During the forty years he has practiced conservative forestry he has converted the timber that decayed or developed serious defect into cord wood and the mature timber into building material, shingles, etc. Of exact figures none are at

hand. It is known, however, that this forty yielded twenty cords of wood a year, aside from building material. Thus far in 1911 the lot has produced one car of spruce pulpwood which totaled eight and nine-tenths cords and brought \$8 a cord f. o. b. station. In addition, 1,500 feet of hemlock sleepers were taken out this year and they brought from \$16 to \$20 a thousand. The wood output this year was thirty-five cords at \$4.50 a cord, the 1911 production being a little heavier than usual. A few years ago Mr. Pillsbury sold seventy-five trees for \$13 a thousand on the stump. They scaled 51,420 feet and brought him \$668.46, more than two-thirds the price of the original forty.

The only figures that would be actually illuminating would be those showing just what had been taken off the forty for a period of years, the net price it brought (less the labor cost of taking it off), with a corresponding charge against the lot of interest on the original investment, taxes paid, etc. It is presumed that if conservative forestry was actually practiced and only mature timber was removed the wood lot is in as good condition today as forty years ago. If this is true there has, of course, been no depreciation. The trouble with this kind of a proposition is that it may look profitable on its face, but when proper charges are made against it, such as cost of superintendence, etc., the actual profit vanishes.

That an operation of this kind supplying a neighborhood need might be profitable is likely also, but an operation on similar lines of a thousand times the magnitude, subject to long shipments of the manufactured product and to meet the competition of saw mills operating on undervalued virgin stumpage, would be impossible.—*American Lumberman*.

Banana Stalks for Paper Pulp

Paper for October 4 has an article on "Banana Stalks and Their Value," by Harry D. Maddox. Banana stalks are among the many products that have been considered from time to time as possibly available for paper pulp. Apparently nothing is to be hoped for from them, however. The banana is a type of plantain, and a close relative of the *musa texilis* of the Philippines, from the leaf stalks of which is obtained the valuable cordage and ultimate paper fibre known as manila hemp. The banana fibre is just as worthless as the manila hemp is valuable.

The yield of fibre in a practical test turned out to be practically three per cent, while the length of boil and proportion of lye puts the material out of the question for papermaking. Mr. Maddox describes the results of tests of paper made from banana stalk pulp.

In the finished paper, he says, there are many defects, which completely neutralize any hopes which may have been held by promoters of the fibre. The surface is dotted with sugary specks of white, while the tear of the stock is exceedingly brittle. It has, moreover, the appearance of a dry manifolded paper and is exceedingly transparent. The color is what may be termed a dirty brown gray, wholly unfitted for any use. Altogether, banana paper may be classed with sunflower, tobacco, and the many other fibrous materials much discussed by those who know little of the real qualifications of a paper making fibre.

No Supply Exhaustless

The words "exhaustless supply" having been revived recently in connection with the Canadian spruce forests reaching north from the Great Lakes to the Arctic Circle, the *Mississippi Valley Lumberman* notes the stunted and scanty character of the growth in the northern part of the region referred to, and adds these wise words of caution: "The word exhaustless has been used a good many times in connection with the timber supply of this and other countries, but its full meaning has not been realized. We must recognize, however, that methods of cutting have been revolutionized and are still in process of revolution. While the per capita consumption of lumber in this country is still increasing, we believe the rate of increase is losing some of its acceleration, or will within the next few years. On the other hand the per capita consumption of pulp wood is probably increasing very rapidly. Possibly, before the available supply of pulp timber is

much nearer depletion the consumption will have been reduced to a point where the scientific renewal will equal the demands made upon the forests. But the word 'exhaustless' as applying to timber supply, has become obsolete in the lexicon of the lumberman, and timber prophecies have been proven unsafe."

Kennebec Valley Protective Association

A protective association has been formed by timberland owners of the Kennebec valley in Maine. The object of this corporation as set forth is to protect the timberland owners where the means employed by the state are inadequate, in order that property in forest land may have the same security that other property enjoys, by promoting and encouraging the practice of forestry upon private land, by encouraging the propagation and guarding of the fish and game, and by the development of the storage reservoirs on the ponds and lakes.

The officers: E. P. Viles of Skowhegan, president; George M. Stearns of Waterville, Forrest H. Colby of Bingham, John C. Hutchinson of Bangor, W. J. Lanigan of Waterville, and Louis Oak of Greenville, vice-presidents; Forrest H. Colby, secretary and treasurer; E. P. Viles, W. A. Gilbert, and Roy L. Marston, directors.

The corporation will have its headquarters at Skowhegan, a capital stock of \$10,000 in five-dollar shares and will, through its directors, employ wardens and men to fight fires when necessary, the expenses to be paid by the stockholders in proportion to their acreage, but the entire assessment never to exceed \$10,000 in one year.



The development of Forestry in the United States was the first direct effort to apply a policy of foresight in the handling of one of our greatest sources of national wealth. ✧ ✧



CAMP AT ELEPHANT BUTTE, NEW MEXICO, WHICH OCCUPIES PART OF THE RESERVOIR WHICH WILL BE CREATED BY THE ENGLE DAM.

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BUILDING THE WORLD'S HIGHEST DAMS

By C. J. BLANCHARD

STATISTICIAN U. S. RECLAMATION SERVICE.

THE Reclamation Service in the nine years of its existence has worked out to successful conclusions many interesting and remarkable problems of engineering construction. Its works, being located generally in regions remote from transportation, have presented numerous difficulties and obstacles to overcome which ability and initiative have been required. The preliminary work consisting of the building of roads, securing rights of way, laying out of camps, and providing the supplies for thousands of men and teams in numerous instances has called for extraordinary foresight and has presented problems which were even greater than that of constructing the great structures for storage and diversion.

The Salt River project was notable in this respect. Preliminary to actual construction of the big Roosevelt dam, the engineer had to survey a wagon road 62 miles in length from the nearest rail transportation to the damsite. For 20 miles this highway was laid across a waterless desert, the balance of the route being through an extremely rugged mountain region. In the mountain section this roadway stands today as one of the finest pieces of road building in the country. To obtain lumber for the camps and buildings it was necessary to erect two sawmills in the national forest where several million feet were cut. A water supply was secured by piping springs several miles away. A large brick-making plant was established. Later a power plant generating 4,000 h.p. was erected and shortly thereafter the engineer set up a cement mill which turned out more than 300,000 barrels of high-grade cement at an enormous saving in cost. The labor problem here was partly solved by instructing 600 Apache Indians in the use of pick and shovel and in other forms of common labor. These phases of preliminary work are cited to make plain the fact that the completion of a large irrigation project in the arid West includes many problems which are not found in engineering works of like character in the East.

During the present year the Reclamation Service began the construction of two large engineering works, each of which is comparable with the work now completed in the Salt River Valley. One of these, the Engle Dam on the Rio Grande about 100 miles north of El Paso, will exceed the Roosevelt dam in cubical contents and in the capacity of its reservoir. The other, the Arrowrock dam in Idaho near Boise, will be the highest in the world. A very large amount of preliminary work was required for both structures. On the Engle dam, which is 13 miles from a railroad, it was necessary to have constructed a broad gage railway to bring in the machinery supplies and cement. The Government co-operated with the Santa Fe in building the branch line and regular daily trains are now running over it. In the various camps about the damsites there are residing approximately 1,500 people. The post office recently established at Elephant Butte, is now the most important in the county. At the Arrowrock damsite in Idaho the Service has nearly completed 22 miles of standard gage railroad and is already operating its own trains over the finished portion. About 800 men are now engaged in excavating for the foundations of this most remarkable dam in the world which is to be erected in the narrow and precipitous canyon of the Boise River. The camps at both damsites are interesting. In each the Government has provided a large reading room for the men which is equipped with books and periodicals. Entertainments in the way of illustrated lectures and church services and also dances are arranged and have become popular. At Elephant Butte a social organization known as the Order of the Royal Elephant has been formed and has a large membership. In both camps a volunteer fire department has been organized and is drilled nearly every evening. A test was given during the visit of Secretary Fisher at Arrowrock in September and in less than a minute the department was playing the hose on a building. The commissary for camps of this size, remote from large supply centers, is a most important adjunct. The Government runs its own mess, and operates in each camp a big department store, carrying all the lines which are needed to supply the wants of the men and their families. All goods are sold at cost plus a small percentage to cover expense of handling. Its ice plant, water works, electric light and other utilities are all available for its workmen. Numerous cottages have been built for the comfort of the engineers and their assistants for which the Government collects its monthly tribute.

THE ARROWROCK DAM.

The site selected for the Arrowrock dam is at a point known as Arrowrock in the Boise River Canyon, about 20 miles above the city of Boise, and four miles below the mouth of South Fork. This site was selected only after a long period of general investigation and months of digging and drilling to determine the exact point where the great structure should rest.

It will be the highest dam in the world, rising 351 feet from foundation to the road along its top, and the roadway will be guarded on either side by a parapet wall three and a half feet high. The dam will be about 25 feet



BUILDING 22 MILES OF STANDARD GAGE RAILROAD TO ARROWROCK DAMSITE NEAR BOIST, IDAHO, WHERE THE RECLAMATION SERVICE IS NOW CONSTRUCTING THE HIGHEST DAM IN THE WORLD.



ARROWROCK DAMSITE AND GOVERNMENT CAMP. THE EXCAVATION ON THE LEFT IS FOR A ROADWAY AND MARKS THE LINE OF THE TOP OF THE DAM.

higher than the Shoshone dam in Wyoming, 67 feet higher than Roosevelt dam in Arizona, and 54 feet higher than Croton dam in New York. Its curved crest will have a length of 1,060 feet. Its foundation will cover an acre of the bed rock. The diamond drills went down 90 feet below the river bed before finding the solid granite bed rock, and numerous test pits, shafts and tunnels were driven in the canyon walls above the water line. The dam will be constructed of rubble concrete, with as many boulders incorporated as can be done economically, probably 20 per cent of the whole mass. About 500,000 cubic yards of masonry will be required. Outlets will be provided at several elevations and starting with a full reservoir the upper openings will be put into commission first. Those lower down being used as the water level drops, so that it will not be necessary to operate any of the gates under very great heads. Provisions will also be made for penstock openings for a power house, in case it may be advisable later to develop power at this site.

A spillway with a normal capacity of 40,000 second feet will be built at the north end of the dam, with a concrete lip 700 feet long following the contour of the ground in a direction generally at right angles to the line of the dam. The water will fall over this spillway into a concrete lined trench parallel to it, by which means it will be carried well beyond the end of the dam and allowed to cascade over the granite cliffs into the canyon of Deer Creek, and thence back into the river. From the records of floods in Boise River it is believed that 40,000 second feet will more than cover any flood that will occur above this point, but the capacity of the spillway may be crowded to 40,000 second feet, and the dam will be so built that water may flow over it to a depth of two or three feet without endangering the structure.

One of the most important problems confronting the engineers was taking care of the river during construction. Two hundred and twenty-five thousand cubic yards of material must be excavated below the river bed. It has been decided to divert the water through a tunnel under the lava bench at the south end of the dam. This tunnel will be 500 feet long, 35 feet wide, and 25 feet high, the arched top having a ten-foot rise. The bottom and sides will be lined with concrete and the top with timber. This waterway will carry the flood waters of ordinary years. Five years will be required to complete the masonry work on this dam, and in the meantime the canal system will be extended to cover 243,000 acres of exceedingly fertile land in the vicinity of Boise.

THE ENGLE DAM.

While the Engle dam will be only four-fifths as large as the Arrowrock in cubical contents, its storage capacity is more than twelve times as great. It will rise 205 feet from foundation to top of parapet wall, will be 1,400 feet long on top, and will contain 410,000 cubic yards of concrete rubble masonry. At the bottom the dam will be 180 feet in thickness, tapering up to 20 feet at the top. It will create the largest artificial lake in the world, a lake 40 miles long, from one to five miles wide, and containing 2,538,000 acre-feet of water. At a gap on the west side of the valley several miles above the dam a spillway 800 feet long will be built at a height of 190 feet above the river bed.

The Engle dam will restrain the largest flood ever known in the turbulent Rio Grande, holding back the flood waters now wasted until needed in the months of low water flow.

In addition to the big dam four diversion dams will be required to turn the waters into immense canals which will distribute it over 180,000 acres of land. One of these dams, the Leasburg, is now completed, and 22,000 acres in Mesilla Valley are already under irrigation from the normal flow of the river.

Historically this is one of the most interesting sections of the United States. When Coronado and his followers swept up the valley of the Rio Grande in search of the Seven Cities of Cibola with their fabled golden treasures, he found the Pueblo Indians operating crude canal systems and cultivating their crops. The same ditches, some of them enlarged and extended, are in use today, but in many instances the ditches are small and crude, and the lands are tilled in the most laborious fashion, largely by hand. With the initiation of Government work modern methods were introduced by progressive farmers, there has been a healthy growth of cities and towns, and it is safe to predict that the time is not far distant when the Rio Grande Valley will be one of the progressive, up-to-date agricultural communities that characterize the West.

STUDIES FOR REFORESTATION

By A. G. HAMEL

FOREST ASSISTANT

HISTORY repeats itself" is an old adage that is often heard and one which seldom fails. This is especially so in case of the history of the development of the resources of a country. History is an accumulation of experience and experience is what makes perfect. European nations have been through the same crisis, with regard to their resources that the United States is passing through at present. Some have passed through it successfully, while others gave no heed until it was too late, so we must profit by the experience.

Much criticism and abuse has been heaped upon the Forest Service, more especially by those who are unfamiliar with its work and the results which men engaged in it are attaining. When immigrants first settled in this country the forests were abundant, covering the hills and vales as far as the eye could see. Agricultural land was needed and as a result the primeval forests fell before the advance of civilization. Man in a few years destroyed what nature had taken centuries to perfect. This continued until now what was once a dense forest is nothing but a barren waste with a few high stumps and burned trees left as a monument to the once covered hills.



BOISE DAM AT WHICH THE RECLAMATION SERVICE IS NOW ERECTING A POWER PLANT. THE POWER TO BE TRANSMITTED TO AND UTILIZED IN THE CONSTRUCTION OF THE ARROWROCK DAM.



PREPARATION OF THE GROUND BY PLOWING, AND SOWING THE SEED BEFORE THE HARROW WITH CYCLONE SEEDER. YELLOW PINE SOWING IN BLACK HILLS FOREST, SOUTH DAKOTA.



BROADCASTING BY THE USE OF CYCLONE SEEDERS WHERE THE SURFACE OF THE GROUND IS PARTICULARLY FAVORABLE FOR THIS METHOD. YELLOW PINE SOWING IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.

Nature was lavish and slow in her methods, she did not do everything in a day, so the problem of reforestation which confronts the Forest Service is one which requires slow, painstaking work and a great deal of observation on the part of the men engaged in it. Much of the preliminary work done along these lines has been misunderstood by the general public, "sample plots," "germination per cents," "physical factors of the habitat" and the like, meaning but little to the people at large until once explained to them. Recently an "old timer," while watching the men engaged in experimental work, was heard to remark, "I don't for the life of me see why those Forest Service men want to dilly dally around the hills scattering a few seed broadcast, now and then sewing them in spots, raking some and leaving others undisturbed." They don't even complete it at one time, but come back at different seasons of the year and do the same thing over and over again. Occasionally they come around and locate the small trees by placing a white peg with some figures on it near each tree, fill cans full of dirt and so many other foolish things. The trouble that these fellows go to in this work is all nonsense. I could take a sack of seed and sow more in a day than they would in a year. Why don't they sow a large amount of seed and not fool around marking out small areas with white posts with red and black tops, carefully weighing out and sowing the seed? Nature does not go to all this trouble in growing trees." This is one of many similar remarks heard made by people who are not acquainted with what the men are doing and what they are accomplishing.

European experience has helped us to a great extent, but the problem of reforestation is largely a local one and must be dealt with accordingly. It is to be regretted that not all potential timber lands secure a thrifty stand of young growth "naturally." If they did, the problem of reforestation would be a simple one. In order to best study this problem, which is a very intensive one, sample plots are used to the best advantage. They often mean something very vague, indefinite, and impractical, to those not acquainted with that class of work, but when once understood their value is appreciated.

Nature in her work did not always use the best judgment in determining what species of trees should cover the different regions, but man after many years of study and observation has been able to improve upon her work. Nature has in many instances taken care of reforesting the cut-over and burned-over areas, but where the destruction has been too great, man must intercede before it is too late as it was in parts of France and China. In order to determine the best methods of reforesting these areas small typical sample plots are laid out where all feasible methods of reforestation are tried so as to determine conclusively the proper method before trying it on a more large and expensive scale. Injudicious application of the different methods may result in a total failure, which often eventuates in a great deal of damage through erosion, for instance, or deterioration of the soil.

The work of the Forest Service in the past has been largely of an extensive nature along constructive lines, but now the work has become more settled so that in the past few years it has been much more intensive. The sample plots which have been maintained and studied carefully have taken considerable time, due to the great care which is exercised in this kind of work, but the results obtained are something that can be depended upon since the factor of careless work is entirely eliminated. An illustration of some of this intensive work done on the San Isabel National Forest might explain some of the whys and wherefores. It has always been the idea of nursery men throughout the country that the best depth of sowing seed was to sow it two to three times the diameter of the seed. This was done as nearly as possible in all the seed sowing, but when no appreciable results were obtained, apparently due to the fact that the seed dried out before germination took place, the question naturally arose whether or not the seed was planted deep enough to overcome the drying effect of the dessicating winds which are prevalent in the Rocky Mountain Region during different seasons of the year. Small typical areas, called sample plots, were marked out by having white posts with black tops driven in at the corners of the plot to designate the boundaries. The size of the plots was but 40' x 40' in order that the work be as intensive as possible. Five white stakes with red tops were placed at five different points in the sample plot to mark the sampling points, that is, the points where to take the soil samples which are used in determining the amount of moisture in the soil. The seed is carefully tested in order that the kind of seed may not have any unknown influence upon the results. The same amount of seed was sown in each sample plot, the only difference being that they were sown at different depths. The seed in one bed was shown at a depth of $\frac{1}{4}$ " in another bed $\frac{1}{2}$ " and so on up to 2" in depth. Soil samples to determine the amount of moisture in the soil were taken at different seasons of the year so as to know what influence this had upon the final results. Whenever any of the seed germinated a small white peg bearing the date of observation was placed alongside of the seedling as a permanent record. In some cases where the work is most intensive and all the factors of influence are measured, anemometers (wind guages) are used to measure the velocity of the wind, psychrometers to determine the amount of moisture in the atmosphere and photometers to determine the intensity of the sunlight. In this way all the factors concerned are measured on the different plots so that the results obtained on the different areas can be explained by facts and figures and not by guess work. After repeated observations it was found that the seed should be sown from one to one and one-half inches in depth in order to produce the best results, because these depths showed 25 to 50 per cent better germination than the other depths, under exactly the same conditions. While these results are not conclusive they offer at least a criterion on which the Forest Service men can base their work on a larger scale. This class of work is slow, it will, however, ultimately mean that the Forest Service work will be built upon such a sound basis after years of experimentation that the saying, "success comes to him that tries," will not be amiss.



FIVE-YEAR-OLD YELLOW PINE FROM BROADCAST SPRING SOWING ON THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.



PREPARATION OF THE GROUND AND SOWING OF SEED BY THE SEED-SPOT METHOD.
YELLOW PINE SOWING IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.



No. 1. A VIRGIN STAND OF LODGEPOLE TIMBER, WHICH HAS NEVER KNOWN THE LUMBERMAN'S AX.



No. 2. THIS SHOWS THE DENSITY OF THE LODGEPOLE PINE ON THE BIGHORN NATIONAL FOREST. IT IS FROM 12 TO 24 INCHES IN DIAMETER.

LOGGING ON A NATIONAL FOREST.

By SIDNEY L. MOORE.

ASSISTANT DISTRICT FORESTER

HOW do lumbering operations on the Government's National Forests differ from those of the private company upon its own lands?" is a question constantly asked by interested lumbermen for the reason that the exploitation of stumpage purchased from the Government is daily undertaken by an increasing number of lumbermen who have no timber supply of their own or have exhausted their holdings. This meant to be a brief, pictorial description of a large lumbering operation upon the Bighorn National Forest in the Bighorn Mountains of Wyoming, showing the progress of the timber from the stump to the mill yard. It makes plain that the differences between logging on private and on government lands are slight in so far as they affect the pocketbook or profits of the logger. On the other hand, the slight differences in methods which do exist, while costing but little to the logger, make a tremendous difference in favor of protecting the existing forest and encouraging future growth.

In this particular operation the timber consists of lodgepole pine, of which there are heavy stands located in the Bighorn Mountains at an elevation of from 8,500 to 9,300 feet, some twenty-five miles from the nearest railroad. The most valuable product of this operation is railroad cross-ties, but the operator also manufactures and sells mine timbers and lumber. The timber is manufactured in two mills, a small sawmill located in the mountains and the main mill twenty miles away in the valley, on a side track of the main line of the railroad. The logs, ties and such dimension stuff as is cut at the smaller or upper mill are shipped in a V-shaped water flume 25 miles through the mountains to the large mill and yards below.

Views Nos. 1 and 2 show the virgin stands of lodgepole timber before they have been touched by the ax. The timber is naturally of rather small size, ranging from 12 to 24 inches in diameter, but these sizes are especially suitable for the production of railroad ties and mining timbers, with a limited quantity of "side lumber."

View No. 3 shows the forest after it has been cut and the logs and ties removed. In this picture are shown the piles of brush made from the top of the tree which could not be utilized. When operating on National Forests, the logger must pile the brush and refuse as shown here, but the extra cost

entailed does not exceed 25 or 30 cents per thousand board feet cut. In contrast, View No. 4 shows some private timberland which has been cut over in the same general locality without any disposal being made of the tops and other debris resulting from logging. There is no need to point out to any lumberman the fact that the conditions shown in View No. 4 present a fire trap that is a constant menace to the property of all timberland owners, government, corporate and private.

After the National Forest area has been cut over by the lumberman, who has removed the largest and best of the mature trees, the brush piles shown in View No. 3 are disposed of by burning. The brush piles on this area were burned by Forest officers during the winter when the ground was covered with a foot or two of snow, which eliminated the danger of fire running in the forest.

View No. 5 shows the log pond and small sawmill located within the National Forest where the smaller logs are cut into ties or mine timbers and the larger logs are slabbed for shipping through the flume to the larger mill in the valley.

View No. 6 shows a railroad tie which has just taken the plunge into the flume after it has been thrown off the carriage of the small sawmill, from which it goes floating on its course to the yards of the valley mill.

Views Nos. 7 and 8 show the large sawmill plant in the valley where the timber not handled in the smaller mill is finally manufactured into merchantable products. The smaller trees and top logs which are used in the round, for mining timbers are lifted from the log pond and placed in the mill yard by the chain conveyor shown in View No. 7. The railroad ties which have been floated down from the mountain are loaded direct from the mill pond on an endless chain into the railroad cars.

The only points in which this logging operation differs from one conducted upon private lands is in the piling of the brush, the leaving of a fair stand of young timber, and the protection of that timber so that it may produce a future crop of merchantable trees. Lumbermen throughout the western part of the country already keenly realize the manifold advantages which they gain by purchasing stumpage from the National Forests and sales of government timbers have shown a tremendous increase within the past few years. Two of the most important advantages which a lumberman gains by purchasing his stumpage from the government consist in the fact that he assumes no fire risk, since if the timber were burned before he had completed cutting his purchase, the loss would fall upon the government, and, secondly, by purchasing stumpage from the government he is enabled to pay for it under a system of partial payments and avoid the necessity of having a large amount of capital tied up in standing timber long before he can realize upon it.



No. 3. PRIVATE TIMBERLAND AFTER LUMBERING BY PREVAILING METHODS OUTSIDE THE FOREST. THE CONTRAST BETWEEN THIS FIRE-TRAP AND THE SERVICE CUTTING IS APPARENT.



No. 4. THE FOREST AFTER LUMBERING WITH LOGS AND TIES REMOVED AND BRUSH PILES MADE FROM THE TOPS OF THE TREES THAT CAN NOT BE UTILIZED.



No. 5. THE LOG POND OF A SMALL SAWMILL, LOCATED WITHIN THE BOUNDARIES OF THE FOREST. TIES, SMALL LOGS AND LARGE SLABBED LOGS ARE FLUMED TO THE LARGER MILL IN THE VALLEY.



No. 6. THE SPLASH FROM A RAILROAD TIE THAT HAS JUST BEEN THROWN OFF THE CARRIAGE OF THE SMALL SAWMILL, INTO THE FLUME.



No. 7. THE SMALL TREES AND TOP LOGS USED IN THE ROUND FOR MINE TIMBERS ARE LIFTED FROM THE POND TO THE MILL YARD BY THE CHAIN CONVEYOR.



No. 8. A GENERAL VIEW OF THE LARGE SAWMILL IN THE VALLEY WITH ITS MILL POND, FROM WHICH TIES ARE LOADED DIRECTLY ON THE CARS BY ENDLESS CHAIN.



RETURNING FROM A HALF DAY'S WORK WITH TRAVERSE TABLES, PENN STATE FORESTRY CAMP, HICKS RUN, PENNSYLVANIA.
Photo by Hugh P. Baker.

PENN STATE COLLEGE OUTLINES A NEW UNDER-GRADUATE COURSE IN FORESTRY.

BY PROF. H. P. BAKER

DURING the past ten years most of the Departments or Schools giving undergraduate work in Forestry have outlined their courses largely upon the basis of work done in the schools organized earlier at Cornell and Yale. Many of these courses started out with an elementary or synoptical course which was designed to be a general course giving students a rapid survey of the development and practice of Forestry in this country. Following these were courses in Silviculture, Mensuration, Management, and other courses as time allowed. Most of the courses were given with a relatively small amount of practicum, though the amount of theory and practice necessary in both graduate and undergraduate schools will probably be a disputed question for some time. So far many of our undergraduate courses have been weak through lack of work in such closely related lines at Botany, Zoology and Entomology, Geology and Mineralogy, Economics and the English Language. This condition is often difficult to remedy because the work was outlined in departments preparing men mostly for other lines of work or departments were organized where they are controlled too largely by interests of the schools of which they are a part, such as Engineering, Agriculture or Liberal Arts.

The course given below has been adopted recently for the Department of Forestry in The Pennsylvania State College, and it is believed that for the present time it meets very nearly the requirements for training for an undergraduate degree in Forestry. The first year and a half is given to foundation subjects in the following proportion:

Mathematics and Mechanical Drawings.....	7 hours
French or German.....	12 hours
English Composition.....	10 hours
Chemistry	11 hours
Botany	10 hours
Carpentry	1 hour
Geology	4 hours
Physics	4 hours
Surveying	3 hours

AMERICAN FORESTRY

Sophomore Year

SECOND SEMESTER

Agron. 6 Soils (Forest).....	4
Agr. Chem. 20 Chemistry of Forest Products.....	4
Survey. 14—Topographic.....	3
Foren. 4 Debating.....	1
Fr. 4 Ger. 4 or option.....	3
Phys. Ed. 4 Drill.....	1
Forest. 2 Silviculture (Nursery Practice).....	4
Forest. 15 Dendrology 1.....	2
Summer School—Forest. 7 (8 weeks).....	7
Mensuration	
Engineering	
Systematic Botany	
Forest Description	

Junior Year

FIRST SEMESTER

Foren. 5 Public Speaking.....	1
Hist. 1 English Economic History.....	3
Zool. 2 Elementary Zoology.....	3.2
Bot. 6 Plant Physiology.....	4
Min. 1 Elem. Mineralogy.....	2.4
Forest. 3 Silviculture.....	3
Forest. 4 Mensuration.....	3
Forest. 15 Dendrology II.....	2

Junior Year

SECOND SEMESTER

Bot. 7 Histology.....	3
Bot. 11 Diseases of Trees.....	3
Foren. 6 Public Speaking.....	1
Pol. Sci. 13 Political Parties.....	4
Hist. 2 Amer. Econ. History.....	3
Zool. 8 General Entomology.....	4
Forest. 10 Wood Technology.....	3

Senior Year

FIRST SEMESTER

Pol. Sci. 14 Economics.....	4
Zool. 11 Forest Entomology.....	3
Forest. 8 Management.....	4



Photo by Hugh P. Baker.

LUMBERED AND BURNED TRACT WITH VIRGIN FOREST IN BACKGROUND NEAR CAMP
OF PENN STATE FORESTERS ON JOHN E. DU BOIS HOLDINGS
AT HICKS RUN, PENNA.



Photo by Hugh P. Baker.

HEMLOCK CUT AND PEELED. HARDWOODS TO BE TAKEN OUT IN THE WINTER.
NEAR PENN STATE FORESTERS CAMP, JUNE, 1911, ON TRACT JOHN E.
DU BOIS NEAR HICKS RUN, PENNA.



VIRGIN FOREST NEAR
CAMP OF PENN STATE
FORESTERS ON JOHN E.
DU BOIS TRACT NEAR
HICKS RUN, PENNA.
LARGE CUCUMBER TREE
in MIDDLE GROUND.

Photo by Hugh P. Baker.



Photo by W. D. Clark.

CAMP OF PENN STATE FORESTERS IN VIRGIN FOREST OF HEMLOCK AND HARDWOODS
ON HOLDINGS OF JOHN E. DU BOIS NEAR HICKS RUN, PENNA.

Forest. 9 Lumbering.....	3
Forest. 13 Law.....	3
Forest. 17 Forest Economics and History.....	2
Forest. 22 Forest Engineering.....	2
Second Semester—In Camp in the South or West	
Forest. 16 Lumbering	
Forest. 18 Management	
Forest. 23 Forest Report Writing and Abstracting	
Forest. National Forest Practice	
Forest. Range and Grazing Problems	

The number of hours refer to the number of recitations per week. One recitation period being equal to two of practicum.

Eight weeks of the Sophomore summer is spent in field work on some large forest holding in northern or western Pennsylvania. For the past three years this summer work has been given on the Fox Estate at Foxburg, and on lands of the John E. Dubois Lumber Company at Hicks Run. The accompanying pictures show something of the conditions on the last mentioned tract. In connection with this Summer Camp there will be offered for the first time in the summer of 1912 a Forest Camp of six weeks for prospective students, timber and woodlot owners, and any one else interested in Forestry. The work for men coming into this camp will be along the lines of Forest Mensuration, Silviculture, Geology and Soils, and Descriptive Botany.

The number of students in the course in Forestry has increased from 5 in 1907 to something over 180 in 1911. The present Freshman Class numbers about seventy men, over half of whom come from outside of the state. Located as the School is, in the mountains of central Pennsylvania and within a short walk of one of the largest state reservations, there are undoubtedly as good facilities for practical study and work as are found elsewhere in this country. Rather unusual soil conditions exist at and near the College, giving interesting differences in plant and forest growth, all of which add greatly to facilities for study. The College lies in a broad limestone valley covered with a hardwood and coniferous growth in which Chestnut is entirely absent. Over the granitic hills two miles to the south there is a mountain forest in which Chestnut, Rock Oak, Red Maple, several Birches, Hemlock, and three Pines predominate. Just to the north of the College is an extensive area known as the Sand Barrens, where the Pitch-Pine is found in abundance mixed with Chestnut and numerous other hardwoods.

The teaching staff of the Department has been increased to four this year and is now made up of two graduates of the Yale Forest School, one from the Harvard Forest School and one from the University of Minnesota.

SCIENTIFIC MANAGEMENT AND THE LUMBER INDUSTRY

BY PROF. R. C. BRYANT

SCIENTIFIC management applied to manufacturing industries has received much attention during the last few years and has met with signal success. The central idea in this movement has been the increase in efficiency of the individual workman and of the shop, by collecting and reducing to a standard, facts concerning the best practice among the competent workers performing a given class of work; by the introduction of modern types of machinery operated at its highest efficiency; and by improvement of factory organization and supervision.

Individual lumbermen have done much thinking along these lines and have put some of the principles into practice. However, as a whole, the industry has not profited greatly from work of this character, for it is still a mooted question to what extent scientific management can be applied to the industry.

It is doubtful if there is any close analogy between the workshop, or factory with its specialized product, continuous operation without reference to climatic conditions; and the camp in the forest with its constantly changing crews, with climatic conditions which may hinder, or prevent operation for a certain period, and where every acre logged and every tree felled may present a new problem.

At the plant of the lumberman methods of manufacture can be standardized to a degree at least; the labor is more stable and the work may be under cover and thus adverse weather conditions overcome. However, even in the mill the problem is not so simple as in a factory. Each log presents a new problem to the sawyer who aims at the best results, because the position, number and character of defects are rarely the same in any two logs.

The lumber industry in the past with its abundant and cheap raw material did not devote a great deal of time to the development of the finer points of organization and administration, especially in connection with the logging end of the business. The time has now come for the lumberman to perfect his organization and eliminate all wastes, if he is to succeed in a business in which the price of raw material is constantly advancing, labor charges increasing and its efficiency decreasing.

The methods of work outlined for manufacturing plants may not prove

adaptable to logging and lumber manufacture, but the general principles underlying the schemes advocated by experts on scientific management contain many helpful suggestions to those who are interested in developing their work to the point of maximum efficiency.

The management of every large lumber operation should have on file in the office, detailed data regarding the title to the property, the character, the amount, and condition of the timber; methods of logging adapted to the region; a scheme for fire protection, etc. This can best be secured by the organization of a forest department in charge of a man capable of supervising cruising, engineering and forestry work. If the size of your operation does not warrant the establishment of the work on a permanent basis, experts can always be secured at a reasonable cost.

The high stumpage values of to-day call for more careful cruising than has been the rule in the past. The owner should know not only the amount of each merchantable species on his land, its location with reference to the topography and outlet; but also should have accurate data about its quality. A knowledge of the latter factor becomes more valuable with each increase in the price of stumpage.

Topographic maps are now considered an indispensable part of every manager's equipment, by all who have been fortunate enough to have used them. In a rolling or rough region they will save, in a short period, many times their cost.

Topographic maps are often made at the time of the timber cruise. They should show the location of all streams, roads, trails, swamps, burned areas, agricultural land, and the elevation of all points. On such maps are often shown in colors, the stand per acre of the different species. The exact location of all timber, the position of light and heavy stands, burns, etc., can be seen at a glance. Accompanying this map should be a report on each logging unit giving all data that is necessary for an intelligent understanding of the problems involved in logging the area.

The entire system of logging roads can be laid out in the office on such a map, and a logger may know several years in advance where his main roads can be located to best advantage; the mileage required and any special difficulties that must be overcome. Careful planning of roads with reference to logging the area as a whole effects a saving in logging costs by reducing the amount of road building.

A PRACTICAL DEMONSTRATION

The value of a map of this character was demonstrated during the spring of 1909. The senior class of the Yale Forest School made a survey and prepared a topographic map of a tract of 30,000 acres in eastern Texas, in a region where railroad location was not easy, because of the broken character of the country. The engineer of the company about one year later was called upon to build an eight-mile extension to the main line which was to pass over

a portion of the tract surveyed, and over which he had never traveled. He laid out the road on the topographic map in the office before beginning field work. After selecting the route which looked most feasible, he went to the field and was able to locate on the ground over five miles of road on the route he had chosen in the office. The location of the remainder of the line was not altered more than a few hundred feet at any point. The work was accomplished in one-fourth of the time required under the old method.

Maps and data of this character are also a great aid to the management because it preserves on paper a vast amount of valuable information often carried in the heads of certain woodsmen of the company. These men may leave your service, and the knowledge they have gained at your expense is gone and can only be acquired by the expenditure of more time and money.

A new foreman can be taught more about your property, in an hour, from a topographic map than he could learn by traveling over the ground for a week. Further, it enables you to discuss with him the plans for logging; show the area to be logged the next season; the mileage of road to be built; the character of "logging chance" he will have and many facts that he often otherwise has to determine for himself when he arrives on the ground.

No lumberman should be satisfied with his operation until he has proven to himself that he has a system as efficient as it is possible to secure. Forest laborers, as a rule, do not migrate out of the general forest region in which they receive their training, and consequently have no opportunity to learn methods other than those common to that particular section. Although the methods in use are usually those best adapted for the conditions existing there, it often happens that woodsmen in other regions have developed methods that are preferable for special conditions you may have to meet. The collection and standardization of the methods of progressive loggers in a given section would be most valuable to every operator.

The organization for the protection of the property against fire is one of the least efficient parts of many lumber operations. Companies conservative in business who carefully protect their manufacturing plant often neglect their stumpage, a product far more difficult to replace than a mill on which insurance can be secured. Although practically non-insurable, stumpage has been left to care for itself until the last few years, and in some sections it still does not receive ample protection.

Every large company should have some comprehensive scheme of fire protection worked out for its tract, and an organization capable of putting the policy into effect when it is required.

CARE OF DETAILS

Improper supervision of felling and log-making crews often results in waste. Through the faulty selection of log lengths and careless marking off of the same, the daily loss often averages several hundred feet log scale per crew. Breakage, due to careless felling and other causes, may increase this

amount. A daily waste of 500 feet log scale per saw crew due to carelessness has been observed on yellow pine operations in the South.

The loss to the stumpage owner is greater than first appears, because it is not only the stumpage value that is sacrificed, but the sale value of the product on the car. It requires but little more effort to bring in a log 16' long than it does one 14' long; the cost of skidding, loading, and transportation to the mill, are increased to only a very limited extent, and on reaching the plant the added cost of manufacture is nearly nil. Therefore you lose the value of this product on the car, because it costs you practically no more to place it on board ready for shipment than it does to leave it in the forest to rot. Close supervision of the saw crews will remedy this matter at a cost which will be a fraction of the loss you otherwise suffer.

There is a wide variation in the rations given to logging animals, and it is certain that they are not always fed economically. The requirements of animals for food are dependent on weight and the amount of work being performed. Each animal requires a certain amount of concentrated food from which it derives the major part of its nourishment and a certain quantity of coarse food which gives bulk to the ration.

There are several essential elements in the concentrated foods which are required in fairly constant quantities for a given weight of animal, when performing a specific kind of work. Different feed stuffs contain these elements in widely varying proportions, and the test of a balanced ration is the ability of an animal to maintain an even weight under the conditions in which it is working.

Every logger should adopt a standard ration for his animals based on tests made under working conditions. The general requirements of animals have been studied extensively both in this country and abroad and data on the subject can be secured from the U. S. Dept. of Agriculture.

Many business men spend much time on the preparation of statements showing the cost of production. These are of value as a guide for comparison of actual costs, but do not show whether the average is greater than it should be.

A close study of the various parts of the operation and the preparation of a statement from the data secured, offers a means of comparison of actual and standard costs, and will point out the weak points in the present system. It enables the management to pick out the departments in which the expenditures are excessive, and to make such changes as are necessary to remedy the faults.

Estimated costs exert a beneficial influence over foremen and other subordinates, because when the actual outlay exceeds the estimate made by them at the beginning of the season their reputation is at stake. The incentive is present for them to attempt to keep expenses down. Where there is no check of this character, it is easy for the foreman to say that high costs are due

to special difficulties encountered, such as inclement weather, bad bottom, or similar factors.

One of the largest operators in the Northeast has given the subject of "efficiency" in woods operations much thought. His scheme requires the collection of data regarding the property preliminary to the beginning of operations; careful supervision and inspection of all parts of the woods work; and a system of records in which detailed account is kept of all work to be performed and all work actually performed.

The plan has been developed from the management side because the company has not yet satisfied itself that a piece work basis of remuneration, with a bonus for superior work, is adapted to their conditions.

The general scheme has been built up gradually and is the result of years of thought and study. While it has met the needs of the particular operation for which it was designed it may not be applicable in all of its details to other operations. It is adapted only to large business concerns, because of the added inspection and clerical force needed to carry out the plan.

KEEPING ACCURATE RECORDS

The system of records is of interest because of its completeness and the success which has attended its use. These comprise three separate sets of books known respectively as the budget, accounting and the statistic.

The budget contains a statement of the work to be accomplished during a given period, preferably for the coming season.

It covers all phases of woods work and is made up by foremen and others in charge of field work. It contains a concise statement of the exact character of the work to be performed under a given foreman's direction; the dates on which, or the period in which it is to be performed; the number of men, animals, equipment and supplies required; and the estimated cost in detail. From this budget the management learns just what work each foreman considers essential; can determine when, where, and what supplies and equipment are needed and the approximate expense of logging for the season. The company also has a standard with which the actual costs can be compared, and if the estimated expense is exceeded, or additional equipment or supplies called for, explanations are in order. In fact, the budget reduces loose guess work to a system.

The second branch, called accounting, deals with the records that pertain to the conduct of the scheme laid down in the budget. The object is to collect reliable and prompt reports regarding the operation in order that the management may have a statement showing the exact status of work to date. This file does not leave the office. Extracts from it may be sent out to subordinates to whom it may concern.

The statistical feature of the records is concerned with the accumulation of the experience and data secured in carrying out the operation. This is the basis of new schemes, or revision of old. It is also an office record.

DECREASING MANUFACTURING COST

The manufacture of lumber is under the direct supervision of the management and the details of organization have received more careful attention than those in woods work. Certain forms of mill work also lend themselves more readily to standardization. Among these may be mentioned unloading logs at the pond, lumber piling and loading, dry kiln work, etc. Work of this character is frequently performed by contract, but even so it may not be done economically. In numerous instances the costs of manufacture could be reduced by a careful study of conditions at the plant.

An example of this was observed in a large mill in the South where, for that section, an unusually intelligent class of foremen were in charge. The cost of operation was considered below the average of mills in the region and the management was satisfied with the results.

The plant consisted of two separate mills, yards, and planing mills, but had only one system of sheds. The yards were each in charge of a foreman, and the sheds were under the supervision of one man. A certain amount of jealousy arose between the different foreman in an effort to keep down the cost in their department, and each man was inclined to throw minor expenses on some other foreman.

To obviate this and to secure closer co-operation among the foremen engaged in handling lumber, a re-organization was made. One yard foreman was assigned to other work and the two remaining men were called to the office and a proposition made to them. The management calculated that the cost of operation in the two departments, through co-operation could be reduced at least ten cents per M feet. They therefore proposed the following: they would guarantee to each foreman the regular salary he had been receiving and in addition one-half of all the saving effected below the sum fixed as the standard cost.

No provision was made by the management for compensating the individual workmen, since the foreman had the authority to hire such labor as they required and pay such wages as were necessary.

The proposed plan met with much favor, and after discussing the situation the foremen decided that they could dispense with fifteen men in the two departments, and accordingly had them transferred to other work. The tasks of some men were increased with added pay, in other cases a more systematic plan of operation took care of the extra work without imposing undue burdens on any laborer.

The results secured by this arrangement were favorable from the start, and the foremen not only kept the price to the standard set, but soon had reduced it five cents, and had in view new methods which would still further cut down the cost. The consequence was that the company was getting its work done cheaper than formerly and the foremen were making higher wages than they could hope to secure under the old system. A stronger personal interest in the work on the part of the men concerned was manifest from

the start. This company has in mind the extension of the system to other work around the plant and also to some of the work in the woods.

THE PIECE WORK SYSTEM

Another application of the piece work system to the lumber industry was observed in a cypress mill which was visited in 1907. The system at this plant has been extended to cover railroad construction, deadening timber, felling and log-making, skidding, pond work, sawing in the mill, piling in the yard and loading on the car, and shingle and lath manufacture.

The method of payment for sawing lumber is unique. In order to encourage the production of high grades of lumber a scheme was devised for the payment of sawyers, edgemen and trimmermen on a basis of quality as well as quantity. A scale of wages on a basis of M feet manufactured was drawn up and in it a premium was placed on the higher grades, with no payment for No. 2, or poorer lumber.

The company has a shingle mill in connection with the plant in which the inferior logs and cants are utilized. In order to overcome the tendency of the sawyers to cut the high grade lumber from the outside of the larger logs and send the inferior center to the shingle mill, a standing order is in force to cut any kind of lumber rather than to send material to the shingle mill.

The tendency of the sawyers to escape cutting low grades is also checked by paying the mill foreman on the basis of the mill cut, without reference to quality. The foreman's desire for a maximum output, coupled with the sawyers desire for quality, keeps the work at a high point of efficiency and yields satisfactory results from the standpoint of the management.

The piece work basis of remuneration has been used for many years by lumbermen, especially in the South. Its introduction was due largely to the irresponsible character of the labor from which satisfactory service could seldom be secured on a daily wage basis. Although widely applied, this system has been considered chiefly from the standpoint of the employer, and little thought has been given to aiding the employee to become more efficient at his task, or to offer him any incentive for increased effort.

Remuneration on a basis other than that of the wage, has come to stay in the lumber industry, and the present ideas are certain to change in favor of some scheme of reward or special ability.

Along with the development of the labor problem will come plans for the better care and management of the forest, more intensive methods of logging and manufacture, and the closer utilization of the raw material of the forest and the finished product at the mill.

The economic forces that are driving industrial plants to adopt more scientific methods of management, in their fight for existence, will soon become vital to the lumber industry. The greatest measure of success will come to those who have intrenched themselves behind an organization which will enable them to place their product on the market at the lowest possible cost in competition with their rivals.

DISPOSAL OF FIRE-KILLED TIMBER ON THE SOPRIS NATIONAL FOREST

By JOHN McLAREN

FOREST SUPERVISOR

WITH approximately 138,000,000 board feet of fire-killed timber on the Sopris National Forest, Colorado, the disposal of this material is one of the principal problems that confronts the officers of the Forest, not only to gain a market for that which is merchantable, but to secure the removal of a fire menace.

No watershed on the Sopris has escaped devastation by fire. This does not mean that there is no live timber on the Forest, or that there are not some portions of watersheds which are virgin timber and have never been cut or burned over. As a matter of fact, there is more than three times as much live timber as dead, though this estimate is ocular; it is nevertheless conservative, and it will probably be found that the proportion of live timber will be even greater when actual reconnaissance work is finished.

The dead timber is of all sizes, from small seedling growth to large trees which were fully mature before they were killed. The greater part, however, consists of poles and log timber of merchantable size. Since the burns are from six to more than thirty years old, the timber represents all stages of decay. Yet it has deteriorated but slowly, possibly because of the altitude and climatic conditions, and there are but few localities where the largest portion of the timber is not still merchantable. These things have brought about a concentration of thought on this one problem, but the dominant idea has been to find new markets and new methods for the disposal of the dead timber, so that the burned areas may be cleared and the live stands improved. That such concentration has had excellent results is shown in the following figures:

TIMBER SALES, SOPRIS NATIONAL FOREST

Year	Live	Dead
1906	4,685,000 feet	6,211,000 feet
1907	3,520,000 "	3,402,000 "
1908	577,000 "	1,788,000 "
1909	502,000 "	2,266,000 "
1910	3,374,000 "	8,559,000 "
Total	12,658,000 "	22,226,000 "
Sale value, live, 26,439. Sale value, dead, \$26,128.		

It can be seen from these figures that in amount the dead timber disposed of exceeds the live by nearly two to one, and that, even though the fire-killed timber has to be sold at much reduced rates, the value almost equals that from sales of live timber.

Every possible inducement is offered to purchasers to help them in handling the dead stuff at a profit. New markets are watched for, low stumpage prices are considered, and special concessions of various sorts are made to permit of its being handled at a profit. The average stumpage rates for the past five years are \$1.18 a thousand for dead timber and \$2.43 a thousand for live. It should be stated that during the greater part of the first year all timber was sold for \$1 a thousand. The highest price received in a sale where all of the timber was dead was \$1.25 a thousand and 50 cents a cord. Much timber has been sold at a lower rate because of its inaccessibility. In some cases it has been necessary to build roads to get the timber out, in others a large proportion was unmerchantable, and in still others it had to be taken from a stand of live timber where care had to be used in logging so that no damage would be done to the young stand coming up. .

While sawmills have been in operation in this part of the country for more than 25 years, it has always been the custom to cut no more dead timber than was actually needed for fuel in the boiler room. But since the Forest has been under administration every merchantable dead tree is removed from the sale area and is utilized for lumber, for "squared sets," or is shipped without sawing for use as "cribbing" in the silver mines. Not only does this conserve the live timber, but it adds greatly to the appearance of the cut-over area and saves the stand from damage which would result if the dead trees were left to be wind thrown or to add fuel to a chance fire. Conservative policies are used with the standing dead timber, and, in marked contrast to logging conditions of the past, all of the merchantable parts of the tree are utilized and where stumps were formerly cut at 2 feet and higher, depending upon the time of the year the cutting was done, they are now not higher than 16 inches, and all timber for lumber or silver mining purposes must be utilized to a diameter limit of 6 inches and even smaller.

During the fiscal year 1911, 4,524 cords of dead material was disposed of to supply props, lagging, and entry timber to coal mines in Pitkin and Garfield counties. This use enables the Service to make a clean sweep of dead timber, because the top diameter limit for such material is usually 4 inches and even as small as 2 inches. And since almost every buyer of dead timber can dispose of small material to the contractor for the coal mines, very few sales are being made which do not include the cord stuff. Thus it can be seen that this problem of securing close utilization has been solved, though it was a hard one because of many, many years of wasteful operation. The local Forest officers, as well as those further from the scene of action, have been the recipients of harsh criticism for sticking closely to this policy of thorough utilization, but since the methods and aims of the Service have become better understood, and since it is known why strict requirements are

made and that good sound common sense is at the back of these requirements, the criticism has largely ceased.

In addition to securing a closer utilization in logging, there is a constant effort to promote a closer utilization of the finished product, with a corresponding decrease in waste. Nearly all of the sawmills are cutting the best slabs into 8-foot lengths and are shipping them to the coal mines for "grain doors"; this has been the practice for a number of years. One mill on the Sopris utilizes the slabs from dead logs for the manufacture of laths; but it has not yet been determined whether this is a paying venture, since there is a low price on Mexican laths, which come directly in competition with them.

An excellent example of close utilization is that of the Colorado Yule Marble Company, at Marble, Colo. Here the edge boards are used just as they come from the log for crating sculptured stone. This company handles large contracts for building material, and since much of it is highly carved and polished it has to be boxed or crated. Since excelsior is used around the pieces, lumber with an uneven edge will serve very well for outside protection. The company operates a sawmill on patented land, and, in addition to lumber which they secure from their own holdings, they purchase from the Forest Service. On this part of the Forest the supply is limited, the market is good, the timber is accessible and easily logged, and stumpage rates are relatively high.

In one case it was possible to interest a company in the exploitation of a large tract of dead timber by making a sale to cover a long term of years at an equitable stumpage rate. The tract was too far from the shipping point to pay a profit in handling under the system of hauling stuff out by wagon, but the company is now constructing an aerial tramway by which they will deliver the material to the railroad over a distance of two miles, as against seven miles by wagon.

As a result of the present policy of encouraging the sale of dead timber, it will undoubtedly be but a short time until a sale will be made of a large tract in Chapman Gulch, where at least 10,000,000 board feet of good merchantable stuff can be had if a road is constructed to bring it out. To induce the building of such a road the timber will be sold at a rate low enough to make it profitable to the buyer, and at the same time get rid of material which would not only deteriorate as time goes on, but would prove a serious fire menace.

Still another method of utilizing dead timber and enlarging the market, for it is through the construction and operating of an open-tank treating plant at Norrie, Colo. This plant was equipped and operated by the Forest Service, and used creosote and zinc chloride as preservatives. It was not run as a commercial venture, but poles and ties were treated at cost simply to get native treated timbers in use and to accustom consumers to this class of stuff. As was intended from the first, the plant was advertised and sold after a thorough demonstration was made and the treated material had

proved its worth. As a result of the demonstration, it was proved that the native timber, mainly lodgepole pine, was, after treatment, as desirable as the more expensive Douglas fir and cedar. The one objection to the native fire-killed timber was that it did not last in contact with the ground, for posts, poles, ties, and mine stulls, when it was used without preservative treatment. With treatment, there was much in its favor. It grows tall, clean, and uniform in size; in a telegraph or telephone line it is much more sightly, than either fir or cedar, because of this uniformity, and strength tests prove it to be near enough to the cedar to be acceptable for nearly every purpose for which the cedar is used. At least two other commercial treating plants similar to the one at Norrie, are proposed, which shows that the Government experiments not only opened the way to a new usefulness for the timber, but inaugurated a profitable industry.

The special concessions that may be allowed besides low stumpage prices, are various, and are carefully thought out to meet each problem. For some good stands of timber on Express and Castle creeks, above Ashcroft, not only will the cost to the buyer be made very reasonable, because of the inaccessibility of the stand and consequent cost of logging it, but a top diameter limit greater than six inches will be allowed. This may seem to be too great a concession, but conditions have to be governed by circumstances; while it is desirable to use all the merchantable parts of a tree, it is, nevertheless, far better to dispose of that part of the killed timber that can be handled at a profit rather than leave it all alone, so that the entire stand will fall into decay.

While various concessions of the character indicated have seemed advisable, they are only such as the condition, quality, and accessibility of the bodies of fire-killed timber warrant. In other words, these stands are handled with the same consideration for their commercial value as National Forest resources which is given to stands of green timber.

The present year is dull in lumbering, but there is a revival in mining; and as new mines are opened, a market which particularly seeks the class of material with which this article deals will be enlarged. But lest the good work of the Forest officers, with its encouraging response in larger sales, should lead to a too-roseate view, it must be kept in mind that at the present rate of disposal, the more inaccessible burns cannot be reached until after the timber will have deteriorated so far as to be unmerchantable; and even with the most Herculean efforts it is not to be expected that the rate of sales can be so accelerated as to remove this fact. In the meantime it is gratifying that practically no timber has been killed by fire since the Sopris has been under administration. A continuance of successful fire protection, together with the further extraordinary effort to clear out the dead timber that will be continued, will show marked changes in a very short period of years; and a longer period, except in the more remote parts of the Forest, will mean the effacement of the unsightly bleached skeletons of once green trees, and the return of a beautiful growing forest, of use and value, a conserver of moisture, and a refuge for birds and game.

VERMONT SUMMER SCHOOL OF FORESTRY AND HORTICULTURE

By B. A. CHANDLER

IN the September issue of AMERICAN FORESTRY there appeared a long list of forest schools. In addition to three graduate schools there are some 66 schools listed as giving some forestry instruction. Judging from the brief description of the courses given in this list, it would seem that less than half of them are giving especial attention to the teaching of agricultural forestry; the remainder specializing in technical forestry. Such a list indicates the need of careful consideration of the tendency in present forest education. We need to realize, first, that the graduate technical schools of this country which are already established, can supply the demand for technical foresters; second, that undergraduate forestry departments in our universities and colleges cannot offer courses that will graduate men who can compete with the graduates from these graduate schools; third, undergraduate forest schools in our universities cannot graduate men who can rank as high in the profession of forestry as men from other departments of the same university rank in their profession. Under these conditions it is manifestly unfair to the students for these undergraduate schools to advertise to give technical forestry courses; but these schools undoubtedly have a field that is distinctly their own which they should cultivate, by teaching their agricultural students how to manage timberland in connection with farms; in giving the farmer of the state this same knowledge; and in giving men who wish to become technical foresters the best possible preparation for the graduate schools. This article does not aim to support these facts with argument, but only to point out a few well known facts.

It is self evident that the graduate schools already established can supply the demand for technical foresters. France, a country that does a great deal of technical forestry work, has only one technical forest school, while we have at least three which have been competing for first place. The United States Forest Service employs the greatest number of graduates of these schools, and it is well known that the supply is nearly equal to the demand.

The undergraduate schools cannot prepare their men as well as can the graduate schools, because, first, the first two years and some of the last two, must be spent in general education; second, the schedule of the forestry men must be adapted to the rest of the institution thus interfering with the field work, which is so necessary; third, one or two men must handle all the forestry subjects, while in the graduate schools each instructor is making a specialty of some particular line; fourth, often the instructors in these undergraduate

schools are giving only part of their time to the teaching of forestry, giving the rest to state work, private business or the teaching of some other subject; and fifth, the men do not average as high grade, and so cannot do as good work, as in the graduate schools because only the more energetic men elect the graduate work.

The men from the undergraduate schools are not only more poorly prepared than the men from the graduate schools, but they are not well enough grounded in their profession to be able to find work of a less technical nature than that done by the graduates of the graduate schools, which will give them equal salary or standing in their profession to that obtained by graduates of other departments of the same institution. It may be assumed that the United States Reclamation Service demands at least as high a standard in civil engineering as the United States Forest Service demands in forestry, and yet it is common for civil engineers from undergraduate schools to enter the Reclamation Service, while almost no men from our undergraduate forest schools enter the Forest Service.

Not only do the graduates from the undergraduate schools find it next to impossible to enter the Forest Service, but they do not find satisfactory employment outside of the government. Owners of large tracts of land who wish to employ foresters desire the best prepared men available and are willing to pay for them. Owners of small tracts cannot afford to employ foresters for, under present market conditions, it takes at least 10,000 acres to earn a salary of \$1,000 by improved management.

There are three distinct lines of forestry education that our undergraduate institutions can and ought to take up. First, preparatory course for the graduate forestry schools; second, the training of agricultural students to properly manage the timber land on the estates they will have charge of; and third, extension work through the holding of short summer schools and in other ways to train the farmers how to handle their wood lots and pasture land.

The universities and colleges having agricultural courses should maintain forestry departments to give the agriculture men training in the handling of wood lands. No agricultural training is complete unless it includes the proper management of such types of timberland as are found in connection with farms. In the future the up-to-date farmer is going to manage this timberland just as intelligently as he does his orchard or other cultivated land. He is not going to use it as a reserve for hard times, as his father did, but it is going to have a distinct place in his system of farm management. Since this is to be the case, no agricultural education is complete unless the management of timber land has been included. The college or university which has no agricultural department has no more moral right to offer a course of this nature than our undergraduate institutions have to offer a technical forestry course; simply because such a course lacks efficiency without the agriculture.

Of course, the great majority of farmers do not attend an agricultural college. They know little therefore about improved farm management or forestry unless it is carried to them. This is being done largely through the me-



CHARLES DOWNER'S OLD SUMMER HOUSE IN SHARON STATE FOREST.



THE CAMP.



FIELD WORK IN HORTICULTURE, VERMONT SUMMER SCHOOL.



TRANSPLANTING WITH GALE PLANTING BOARD.

dium of the "Better Farming Special" trains and the winter short courses in agriculture, farm institutes, granges, etc. A forestry course in an agricultural college or a state forestry department can make use of all these agencies to some extent in educating the farmers in handling woodlands. Forestry, however, is best taught by actual field work and so it would seem that the best means of teaching it to the farmer is through short summer schools held in different sections of the state. They can be held on state forests where the work in planting, thinning, and marking for reproduction cuttings, which has been done, can be seen. After they are started it will be well for a progression of courses to be arranged so that the men who come for a second year will find new work. It is doubtful if such schools should be more than two or three weeks long, for men who are busy on the farms cannot as a rule afford more than this length of time.

So far as the writer knows, Vermont is the only state to have tried a school of this type. Between August 14-24, the state forester in co-operation with the University of Vermont conducted a summer school of forestry and horticulture on the Downer State Forest at Sharon, Vermont.

This state forest is almost an ideal place for such a summer school. It was originally the summer home of Hon. Chas. Downer, and was given to the State by him for the purpose of promoting the forestry work in his section. The forest is well fitted for a school of this type, because, first, the farm house which is occupied by the keeper of the forest can be used as a boarding place for the students and for lecture rooms; second, the two orchards, one bearing and the other just starting, serve as fine practice grounds for the classes in horticulture; third, the nursery gives opportunity for making seed beds and transplanting; fourth, the vacant land not yet planned gives a chance for trying the different methods of planting; fifth, the plantations of many different species on different sites gives the student an opportunity to do some cleaning work and to see what plantations of different species look like and will do on different sites; sixth, the thinning of young maple orchards shows them what a young stand of maple needs; and the marking of the trees in the old stands shows how to cut in a woodlot to get good reproduction and to protect the soil.

The instruction in horticulture was conducted by Prof. M. B. Cummings of the University of Vermont. His lectures of two forenoons were followed each day by about five hours field work. Prof. G. P. Burns of the University of Vermont, formerly of the University of Michigan, gave three lectures and conducted as many field excursions in forest botany. The rest of the time was taken up with true forestry work conducted by Prof. A. F. Hawes of the University of Vermont, who is also State Forester, with three assistants. After these lectures the school was divided into three squads and the remainder of the day into three periods of two hours each. Thus a given squad changed work every two hours. These short periods were considered advisable in order to give a greater variety of work, thus preventing the student from becoming tired and giving them a wide range of work in the available time, and permitting each student to receive more individual attention. The field work included the following:

Making seedbeds, transplanting seedlings, actual planting by the different methods, cleaning in an old plantation, thinning a young maple orchard, marking for a cutting in a mature hardwood stand, the use of volume tables in estimating the timber of a woodlot, and the use of and comparison of the different log rules.

A fair amount of recreation was mingled with the work. The students lived in tents and in the center of the camp ground was a large open fire about which the students sat in the evening and sang songs, roasted corn and enjoyed themselves in other ways. There were eighteen students present from every section of the state, from Richford on the Canadian border, to Brattleboro, near the Massachusetts boundary. They were also of all ages, from sixteen to over fifty, and represented a wide range of occupations; farmers, gardeners, teachers, post-office employees and students.

The big day of the whole school was Sharon Day, when everyone from the surrounding country was invited to a picnic dinner followed by a few short talks. During the forenoon, while the people were arriving, Prof. Cummings conducted a demonstration of orchard pruning. After the addresses in the afternoon, an excursion was conducted over the nursery and plantations. Among the speakers of the afternoon were Dean J. L. Hills, of the State Agricultural College; Prof. M. B. Cummings; Hon. O. L. Martin, Commissioner of Agriculture; Hon. Clement Smith, Master of the State Grange; Mr. Charles Green, of White River, who is as interested in forestry as any man in the state; and Prof. Hawes. This gathering was well attended.

At the close of the school the students were inquiring about the prospect of another term next year and seemed to feel that the money they had invested (the only cost to them was for travel and board) in this term had been well spent. The school was an experiment on the part of the State forester, but was so successful that it will, doubtless, be an annual event.

The University of Vermont is also carrying out the other two lines of forestry education; forestry instruction for agricultural students and preparing students for the technical forest schools. This fall there are ten students taking this forestry course; nine of these are agricultural students who wish such forestry work as will fit them for managing the timberland on the farms they expect to handle. The work will consist of woods surveying, type mapping, thinnings, cutting to obtain reproduction, planting and nursery work, determination of stumpage values under given market conditions, and the use of yield volume, and growth tables. One student is preparing for one of the graduate technical schools and is taking such courses as will fit him for the work there, and such forestry work as will make his work there more valuable.

Sixty acres of forest land were burned over in one day, on October 30th, by a fire that is supposed to have been started by campers near the old Rip Van Winkle House near Catskill, N. Y.

PENAL INSTITUTIONS AND CONSERVATION

By F. A. GAYLORD

NEW YORK STATE FORESTER

THE subject of reforestation is now altogether too familiar a one to dwell on at any great length. It is universally conceived that, in order that our forest lands shall reach a maximum productiveness, they must be artificially reforested, either in whole or in part. The question boils down to not the need of reforestation, but the practicability of it and practicability means nothing more or less than cost. The first questions always brought up when trying to interest an individual in reforestation, are those concerning cost. Where you can interest one person in reforestation if you could prove a two per cent investment, you could interest ten men if you could prove a four per cent and a hundred men a six per cent investment.

We all will agree that there are extremely few, if any, individuals or companies who are willing to engage in a business without a profit. There is only one institution under our present mode of living which is in a position to carry on business in this way, that is, the State. Operating costs being the same, the state is in a position to furnish trees at a lower cost than any individual or company.

There occasionally has been a slight murmur of disapproval at the state engaging in an enterprise of this sort. This disapproval has been so far out-balanced by the opposite sentiment, that it amounts to little, and inasmuch as the state has been the prime mover in the direction of establishing nurseries in many of the eastern states, the disapproval can never be of the importance it would be if the state attempted to invade an already crowded field of industry. Private nurseries will, from the very start, come into existence with the state nurseries an actual fact.

Skiping the familiar arguments as to the state's right to further reforestation, let us concede that the state has, and always will have, a right to grow trees for the private individual, and that the state is in a position to best regulate the most important factors as to how the cheapest trees can be produced. It does not take much figuring to determine the cost of planting a thousand acres at \$7 per acre and then to figure the compound interest for fifty years. Now do the same at \$5 per acre. It can easily be seen that every penny in the reduction of the cost of growing trees is of extreme importance in profitable reforestation. So the question arises, where and how can we cut this cost?

Governor Dix of New York State has gone a great step in advance in answering this question. In the past there has been some talk in using prison

labor on nursery work, but Governor Dix was the first man to come forward and actually work out the plan on a scale of any size and put it into practice.

At Comstock, Washington county, a new state's prison is being built. When completed, it will accommodate 1,500 prisoners and be one of the best equipped prisons in the United States. At present it holds about 400. It is situated only half a mile from the D. & H. R. R. and the Champlain Canal. There is much fertile land in the present tract, water is abundant and the nearness to the Adirondacks, combined with the transportation facilities, makes this an ideal place to start the first prison nursery. This fall ten acres have been turned under to form the transplant nursery for the spring of 1912. At such an institution labor is figured at nothing. What will it mean to furnish transplants, formerly costing \$5 to \$7 at from \$2 to \$3 or less, and seedlings for practically nothing, aside from the shipping charges?

So much for the planters' end. How about the prison end? In the last few years there has been a very strong movement to get away from mediaeval customs still clinging to our prison systems. The movement is gaining momentum very rapidly and primarily it aims to get the prisoner out of the barred cell and place him under more congenial surroundings. Would not a prison nursery be a great step in this direction, getting the unfortunate inmates out in the sun and air, where he would lose his prison pallor and be more healthy and happy. The most intensive methods used in nursery work today could be multiplied and carried out to the extreme, thus insuring the finest kind of nursery stock.

There are of course drawbacks to this system. In the spring when the trees are taken up and new ones are transplanted, a large gang of men is necessary and prison officials are taking great risks if they allow, say, 200 men to work in a field together. This could be alleviated to a great extent by not having the nursery in a single unit, but at a large institution, having several tracts of from five to ten acres, scattered about the usually large area held in connection with such institutions. Again, the class of labor employed here is extremely poor. Warden Homer, of the Comstock prison, figures that the efficiency of prison labor is not more than half that of paid labor. Here the personality of the warden would play a most important part, one warden getting twice as much labor from the same body of men as another. This factor of inefficiency would not affect the ultimate result to speak of, but would be felt mostly in the size of nurseries and productiveness.

Next spring the nurseries of New York State will turn out 6,000,000 trees. If the experiment at Comstock is a success, and there is no reason why it should not be, this number should be increased many times within a few years. A great deal about conservation is heard nowadays, not only forest conservation, but conservation of all kinds, in order that a rich heritage shall be left for the coming generation. The poor unfortunates who are in penal institutions have conserved nothing, not even their moral and mental faculties. Here is a way, then, that they can, in part, pay off their debts to our succeeding generations, and in so doing be vastly the better off for it themselves and to society in general.

STATE FORESTRY—ITS RELATION TO CONSERVATION

THE development of forestry in the United States was the first direct effort to apply a policy of foresight in the handling of one of our greatest sources of national wealth. Out of the ideas which forestry emphasized grew the more recent movement for the proper care and management of waters and minerals. The term conservation is broad enough to cover all forms of management which tend to eliminate waste, safeguard the future and secure the best balance between immediate utility and future value. In this sense it is no new idea. Not only has the individual farmer who is farsighted conserved and developed his farm, but the States and national government have for many years actively assisted farmers through the agricultural department and State Experiment Stations, by educational measures. Forestry was at first confined to a similar educational role. But during the decades 1890-1910 national forestry developed an important new phase,—that of the nation as an owner of forest land. No new lands were purchased in this period, but the nation took the stand that the forest resources then owned by the public should remain in collective ownership and be managed as national property and not as private property. More recently, this same policy is urged for water powers owned by the nation, and for deposits of minerals not yet acquired by private interests. While the right of the nation to retain her own property is pretty fully conceded, the terms upon which this property should be developed and used are not settled and at the next session of Congress these questions must be dealt with. This is the simplest and most important principle underlying national conservation.

In addition to the collective ownership of resources, there arises the possibility that the government should regulate the management of property owned by private persons by wise measures calculated to prevent waste while safeguarding the interests of the owner as well as the public. It is along these two lines of government activity that the public or political features of conservation must develop. Private conservation may be encouraged as in the past, by education.

State governments will have an increasingly important role to play in conservation. Those States are fortunate which have adopted policies enabling them to retain or to acquire forest land, or to hold and lease mineral lands, instead of selling such lands for a small sum before their value materialized. The State, rather than the nation, comes in direct contact with private owners of land, and will be charged with the double duty of properly protecting these lands, and of enforcing whatever regulative measures are found necessary. This is the State's role in conservation.

State conservation must cover soils, forests, water powers, minerals, and fish and game, and will include state activities in education, ownership, and regulation of these resources. The problem before states is twofold—first, to decide what lines the activities of the State should follow, and, second, to create the most efficient form of commission or organization for doing the work.

At first glance it would seem in the interest of economy and efficiency to centralize and combine the field of operation in one commission, and in certain States the tendency is to do so. But this may not prove the best policy. The field of soil conservation is chiefly educational, and this is best handled by the agricultural experiment stations, free from control of state officials. The system of game and fish protection in most states is organized on the basis of state wardens, and is usually self-supporting from fines and other revenues. The management is vested in a state game warden or a state commission. Forestry includes fire protection, and the management of state forest lands. These duties are in most states placed with a forestry commission, or state forester. State lands not devoted to forestry are handled by state land commissioners whose duty is limited to the sale of such lands or of the timber and other natural produce as wild hay, and to more or less efficient efforts to prevent theft and fire. The state land offices have also been responsible for mineral resources on state lands and in a few instances these mineral lands have not been sold outright but mined on lease.

So far no states have done much towards regulating private business, the chief lines along which this may be possible being forests, minerals and water powers.

Consolidation of these activities should be advocated only if it makes toward efficiency as well as economy. In a certain stage of development of a new line of work, it is often best to concentrate attention on it and give it every encouragement by freeing it as far as possible from alliance with or subordination to other interests. An illustration of this principle is found in the relation between forestry and the protection of fish and game. The two subjects are closely related. By combining the work one commission takes the place of two. In European countries the forester is the game warden. And in this country the question of fire protection and game protection each call for a set of wardens employed at least in part by the state. Why should the two functions not be combined under one office and save duplication and expense?

This question cannot be answered on the grounds of economy. No one questions the necessity in cities of a fire department, entirely separate from the police department though it may double the expense. Efficiency is the object, economy being secondary.

Although not so clearly distinguished as in the case cited, the duties and responsibilities of a forest fire warden follow a different trend from that of a game warden. His effectiveness depends upon the impression he can make on the community, and the sentiment he can arouse against setting fires, for the duties of a fire warden should be to prevent fires, not merely to put them out. He should be well versed in local methods of fighting fires, and a good organizer

capable of handling men. Forest fire prevention to be successful requires forestry. The measures necessary to keep fire completely out of forest lands presuppose an interest in the forest crop for the protection of which fires must be prevented. The fire warden to be efficient must be at least in thorough sympathy with forestry, know the value of young timber, realize the damage from fires which burn on cut over lands, and be able to impress his views to others. The most efficient type of fire warden is therefore the one who is employed for this special purpose. The game warden, who is required to serve also as fire warden, may regard these duties as an irksome addition to his real work.

What may be said of the subordinate officials is more emphatically true of the central organization. Consolidation of forestry with fish and game means that the chief official is too often interested in the one to the neglect of the other. The chief fire warden of a state should either be the state forester or his assistant. A forester has a full appreciation of the real purpose of forest fire prevention and is working for the ultimate object back of it, mainly, the production of timber. Under his direction the fire wardens are constantly stimulated to better work, organized and instructed, and get results. If the Fish and Game Commissioner is required to be the State Fire Warden he has not the same interest. In most cases he has not a forester's knowledge of the subject, lacks incentive and performs his duties in a routine manner. We must have active progress if the fire problem is to be met. Efficiency, not economy, should be the watchword.

This is not an argument against allowing fire wardens to act as game wardens, if thought advisable, nor of allowing game wardens to serve as supplementary fire wardens. But the responsibility for the enforcement of fire laws should not be placed with a Fish and Game Commission any more than the enforcement of the State Fish and Game laws should be placed on the shoulders of the Forestry Department. Consolidation of these two departments does not at present seem advisable. In actual practice the states which have kept these departments entirely separate and have done good work in fire prevention are: Maine, New Hampshire, Massachusetts, Connecticut, Pennsylvania, Maryland, Wisconsin, Minnesota, Montana, Idaho, Washington, Oregon and California. Of these, Oregon recently abandoned the plan of using her game commissioner as state fire warden, in favor of fire wardens responsible to a forestry commission. Minnesota's new law installs an extensive force of fire wardens responsible to a state forester, and independent of the state game warden.

Of the states which have tried consolidation New York has since 1895 until 1911 had a Forest, Fish and Game Commissioner, who controlled both departments. But the work of each has been entirely separate. The superintendent of forests, with a force of appointed fire wardens paid by the state, protect the state lands from fire, and enforce other forestry laws such as the law requiring the tops of conifers to be lopped. A separate force of game wardens serves in the same territory, and are required to report fires and

supplement the work of the fire wardens. But there never has been an attempt to consolidate these two field forces, for it is well known that efficiency in either direction would suffer by it.

The State of Michigan has placed the enforcement of her fire laws in the hands of the State Game Warden with his field deputies. Michigan has faced for years one of the worst fire problems in the country and so far has failed to solve it. No reflection is intended on the State Game Warden who has made a strong effort. But the official who must cope with the fire problem in Michigan should be relieved of the burden of administering the fish and game law if he is to ultimately succeed. And it is only through forestry that success will ever be secured. A few southern states, as Alabama and Kentucky have, for purposes of economy, utilized their game warden force as fire wardens.

The conclusion drawn from the present condition of forest fire legislation is that the functions of State Fire Warden and State Game Warden, and of local fire and game wardens, should not be consolidated, and that this consolidation if effected will tend to seriously diminish the efficiency of the fire laws and the ultimate chance to secure the practise of forestry on a proper scale.

Further questions of consolidation will arise regarding forestry and state lands, minerals and water powers. The natural lines of organization will tend to the control of state lands and their resources by one body. This has already occurred in Michigan, where the Public Domain Commission now has charge of all state lands, and has superceded the Forestry Commission. In other states, as Wisconsin and Minnesota, the State Land Commissioner, or corresponding official, continues to handle all state lands until they are officially designated as forest reserves, when their control passes into the hands of the Forestry Commission. A division of responsibility similar to this exists in the national organization where the Department of the Interior retains jurisdiction over all public lands except those reserved for forestry, which are administered in the Department of Agriculture. And the same suggestion for consolidation has recently been made publicly by the Secretary of the Interior, the plea being that of economy and the avoidance of duplication of work.

In states where conservation commissions may in the future be established, as in New York at present, and in Louisiana, such commissions will undoubtedly combine forestry with the subjects of control of state lands, water powers and minerals. What effect this form of consolidation will have upon the development of forestry in these states is not a foregone conclusion. Forestry far more than mere forest fire prevention, demands trained services. Both for education, which the people, land owners and others need, and for the creation and management of State Forest reserves, the department should be so organized that there shall be practically no possibility of political appointments.

At present several states have Forestry Boards composed of members selected in such a way that the party in power cannot control them politically. In Wisconsin the board of five members is made up of the president of the

State University, dean of the State Agricultural Department, and three others. In Minnesota the Board of Regents of the University nominate two members, and the State Agricultural and Horticultural Societies also nominate members, while the dean of the Agricultural Department is a member ex-officio. Such boards have the appointment of the State Forester, thus insuring the permanence and freedom from politics of the forestry work. Similar wise provisions are in force in Maryland, Oregon, and New Jersey.

The danger to forestry from consolidation would arise in two ways,—first, through improper organization of commissions allowing appointments to be made for political reasons, and second, from subordinating the forestry work and placing it in the hands of some minor official with no particular authority or prestige. So much remains to be accomplished before state forestry even begins to fulfil its proper functions and the rate of progress is so slow compared with the need that should there be any real danger of losing ground by such consolidation it had better not be attempted.

The prediction may be made that the states which show the greatest progress in forestry in the next decade will be those which adhere to a policy of laying emphasis on forestry through the form of their state organizations. The conservation of other forms of public wealth is equally necessary, and may be accomplished at the same time and possibly by the same organization. But while there is a chance that ground may be lost, the advisability of consolidation in the interest of economy must be considered cautiously.

COMMERCIAL REFORESTATION

THE commercial possibilities of reforestation conducted upon a scientific and business-like basis are described in an article by Staff Correspondent Tinkham of the Grand Rapids, Mich., Press, following a visit to the forty-year-old second growth forest of David H. Day, near Glen Haven, Mich.

“The story of David H. Day’s forty-year-old idea of making nature replace the timber from which man had carved fortunes and his modern, practical and detailed conception of what the future holds in store for the successful reforester, needs no embellishment,” says Mr. Tinkham. “It speaks eloquently enough of the almost wizard-like foresight of the man and is tribute enough to his desire to build such a monument as few men in this world leave behind,

“But it is not wholly a desire to leave some material indication of his life work that is prompting David H. Day in pressing forward with his scheme of reforestation. He has it figured to a year, almost to a day and to the foot of timber what his new forest will net. He knows what the various timbers will be used for. He knows and has detailed plans for the utilization of this fortune nature is creating for his children and his children’s children. And suffice to say that his plan encompasses what twenty years from now

will be a perpetual commercial forest that from year to year, indefinitely will keep the Glen Haven mill busy and furnish timber right at home in Michigan when lumbering will be an industry crowded into the remote places of the extreme north and west of the continent.

"David H. Day's forest is growing upon land that originally furnished fuel for what was in its time the greatest line of steamers that plied the great lakes. It was because Glen Haven was a wooding station for the boats of the old Northern Transportation Company which ran from Ogdensburg, N. Y., to Chicago, that Mr. Day had his introduction to the Glen Lake country. And before any other person in the United States had conceived the idea of scientific reforestation, the young steamboat agent, looking out upon the cut-over acres that had given fuel for the boilers of his steamships and seeing nature's determination to replace the slaughtered trees, conceived the idea that some time in what to him must have seemed the dim future timber in Michigan would be in such great demand that nature's work on this particular ground would yield up a fortune.

"When he obtained title to the lands he began giving nature the aids now recognized as a part of scientific reforestation. And he has watched the young trees shoot straight up as they reached and reached to place their foliage within the realm of the sun until now the day is not far distant, certainly not beyond the limit of his expectancy, when the forest will realize all his dreams and even more.

"During all these forty years since Mr. Day conceived the idea of growing a new forest upon the veritable graveyard of the virgin timber, this acreage has been one of his chief prides. He has seen his own ideas taken up and put into execution by national and state governments. To him there is nothing new in the term conservation. It has been the watchword of his operations.

"Forty years ago he was laughed at by the lumbermen of that day. The men who laughed were those who cut and slashed ruthlessly, made their fortunes and left the slashings an invitation to fires and devastation. David H. Day's methods are and always have been different and his reward will come when this 2,000 acres begins that period of perpetual yield toward which he has worked and planned.

LOOKING FAR AHEAD.

"His foresight today seems so extended and penetrating and calculating as to be just as much ahead of the times as in the days when he was alone probably in all the United States in his ideas of the value of reforestation and conservation. There can be no question that were his future plans dependent upon present conditions they probably never could be fulfilled. But Mr. Day has taken into consideration the inevitable increasing demand for timber. He has studied the methods in Germany, where the population demands have so restricted timber growth as to force upon the government the necessity of a conservation as yet undreamed of in America. He sees the

time when conditions will not be so far different in Michigan. He calculates carefully upon the fact that twenty years hence there will be none of the waste that characterizes the lumbering operations of today and he takes this into consideration in his outline of a schedule of lumbering upon his reforesting tract. When this forest matures to this point where cutting for his mill may be begun, a new era will have set in and the same acreage will be yielding greater returns.

"As has been indicated, with all this carefully calculated knowledge of what the conditions will be some fifteen or twenty years hence, he has been able to outline a tentative schedule and he has figured this 2,000 acres with perhaps a few hundred more to be obtained as the years pass, will be ample to keep the Glen Haven mill busy indefinitely. Under his plan of conservation and economy, nature simply will keep the saws constantly supplied. His forest tract will be no different in commercial aspect than his orchards. Each year he will harvest a crop of logs sufficient for his mill. When his children assume direction of his interests the mill always will have its raw product at hand. Indefinitely this cycle of things will continue, while the price of lumber and the demand constantly are increasing.

"Off hand Mr. Day could not tell how many acres he owns. It approximates some 5,000, however. And he has some of the finest tracts of virgin timber left standing in the lower peninsula. In fact he has enough of this standing timber to keep his mill constantly in operation until that time when the realization of his dreams and plans for the 2,000 acres of reforesting shall come.

"Probably nowhere in Michigan is there a more beautiful piece of timber land than this forest park of David H. Day. He makes no secret of the fact that had he no future plans for it he would have been more than repaid for his trouble and care in the simple grandeur of his acreage. There is nothing commercial about it. As one drives through its innumerable winding roadways it resembles nothing more than a magnificent park. There is a fine assortment of trees and they are growing just as nature intended they should, straight up and sturdy. There is a fine growth of oak, pine, maple, ash, cherry, hemlock, poplar, birch, etc.

"When these trees, aided as they have been by Mr. Day's conservation ideas, reach that point of maturity where they are ready for the market they will offer fine long, uniform logs, such as only that primeval forest gave to the saws of the pioneer lumbermen. And they will come to the market in the days when the very scarcity of the material has created a different regime of manufacture. For instance, the oak and the cherry and the ash will go to the veneering machines rather than to be pushed through the conventional log saw, where there is often more than 25 per cent waste in sawdust alone. The white birches, those most ornamental of all trees, such as have been prematurely sacrificed in order that the Grand Rapids Apple show be suitably and appropriately embellished, will be conserved to the last square inch in

order that the greatest possible number of thread spools may be turned from them.

"New chemical uses have been discovered for what one day was the refuse. Twenty years hence there will be still further uses. Not a twig will be wasted. It seems simply inevitable that fifteen years from now, judging from the increased demands for wood and the consequent increase of prices, that this 2,000 acres will be just as valuable an asset to David H. Day or his heirs, as any gold mine.

NEW PLAN OF LUMBERING

"The lumbering operation he has planned for the tract will be as different from the methods of today and of twenty years ago as the demand, the prices and the manufacturing utilization will be. He admits it would not be practical from a financial point of view to begin today upon the plan he has in mind for the future even were his reforestry experiment matured to that point where he would be justified in beginning the cut. It will be a new era in the woods. The axmen and sawmen will not go through and clean out every available tree. It will be an annual thinning out process. There will be a limit fixed below which no tree must be disturbed. Trees will be felled always with the idea of conservation uppermost. The smaller trees, the crop of future years will be protected. There is bound to be some little damage in this event where trees grow in such close relationship as in the Day forestry acres. But the men will work carefully.

"Fifteen or twenty years from now, Mr. Day estimates, his mill will have sawed up the last of the virgin timber he holds or will in the meantime be able to procure. By that time he will be prepared to put his plans into execution and his reforestation tract will be ready to yield its first dividends.

"He has figured the thing out very carefully and is satisfied that his estimates are entirely conservative. Two hundred acres will be sufficient under the new order of things that then will prevail, to keep his mill busy for a year. As has been said, the acres will not be cut clean. Trees of twelve, probably fourteen inches, only will be taken. All under that size carefully will be preserved. The woods will be cleaned up trimly as the logging operations advance. Protection against fire will be afforded and upon practical lines. By cutting over or rather, by weeding out the marketable timber of 200 acres every year, it will be ten years between the cuts over the same acreage. In other words, ten years will be required to cut over the 2,000 acres and the total acreage will be much larger than this by that time. At any rate, Mr. Day figured on ten years and says it is eminently conservative.

"The thinning out operations will have the effect of giving the remaining trees new impetus. Ten years will be sufficient to bring enough other trees to cutable size to give the mills another year's supply from 200 acres. It will be evident that this means a constant rotation of things. Year after year a fixed area will be cut over. And once in a decade the same ground will be

gone over again. A good portion of the timber will be of the so-called semi-rare variety such as oak, cherry, ash, birch, etc. By that time they will seldom be using solid oak or cherry or ash. The foundation as it is today in many branches of wood manufacture will be of baser wood with a veneering of the higher grade to bring out all the beauty of grain and finish. The makers of thread are having trouble already getting white birch for their spools.

"It may be interesting to those who are visitors at the Grand Rapids apple show and who admire the fine white birch of the artistic booths, to know that thus far the thread manufacturer has been unable to find any substitute for white birch for spools that may be had at anything like a usable price. Almost every other variety of wood undergoes chemical changes and contains chemicals that would discolor the thread, especially the light tinted and white threads. Obviously this would be impracticable. So it is to the white birch the thread manufacturer must look for spools upon which to market his product. It is apparent then that white birch worthily deserves its name. Like its snow white coat it is white clear to the heart. Its sap is pure white and contains nothing from which a discoloring residue is left.

"There are thousands and thousands of these trees on the 2,000 acres of Mr. Day's reforestation tract. They all are pretty well matured. There is indication of a great fortune some day in white birch alone. The white birch for the land and apple show at Grand Rapids was picked out by Mr. Day personally and shipped some weeks ago. It is now being made into booths and bungalows in a building on Campau Street.

"The main tract of forest owned by Mr. Day comprises fourteen hundred acres. He has another tract of some 600 acres that is identical, though not exactly contiguous. The main drive through these acres and acres of magnificent young forest growth is one of the most popular trips in northwestern Michigan. It is the magnet that draws many automobile parties from all parts of the state."

During the season just closed, the state fire wardens and rangers of the Washington Forest Fire Association issued a total of 5873 permits to burn slashings. Forester Baileys says, "This indicates that the small rancher is clearing up his logged-up tract of land and putting it under cultivation at a more rapid rate than ever before."

EDITORIAL COMMENT

EXCEPTIONS will probably be taken to that portion of Mr. B. D. Chandler's article in this issue, which deals with the undergraduate forest school and the training and ability of its graduates. It is undoubtedly true that in the best grade of undergraduate schools a very thorough preparation for technical forestry may be obtained, and at the same time the student will save one or two years and considerable expense in getting his forestry education. Many men have passed the civil service examination for Forest assistant and received Forest Service appointments from undergraduate schools, and they will undoubtedly continue to compete with graduate schools for these positions. But, on the whole, the statements made in this article are substantially true. There is need in forestry for two classes of men: first, woods foremen and local superintendents of small estates, who are capable of conducting work such as planting, cutting of timber, or running a portable sawmill, at a salary which will bear a reasonable relation to the size of the tract and the revenue it will yield; second, foresters, capable of solving all problems arising in the profession. The standing of such men compared with the woods manager is that of the civil engineer compared to the construction foreman. The latter needs a practical education, but no one would deny the need of giving the engineer the best theoretical training, nor does he become less practical on account of it.

The technical problems which the high-grade forester must solve are met in the fields of

a. Management of very large forest areas in which problems of policy, business and scientific research are combined, such as for instance on the National Forests.

b. Organization and management of State forestry, involving the development of State policies, education of the public, plans for fire protection, taxation of forests and practical assistance to owners.

c. Private work, either connected with some large owner as a corporation or railroad where the work calls for diversity of training and application, or as consulting forester, whose function, like any other expert, is to give advice and formulate plans for the management of forests.

It is to fill these needs,—that of the forest engineer,—that the high grade schools exist, and the graduate schools have an undoubted advantage over undergraduate institutions, largely for the reasons given in the article.

On the other hand, a far greater number of men will be needed to fill positions of immediate responsibility in managing small forest estates, acting as rangers, woods foremen and in similar capacities, than will ever be needed for the broader positions. It would seldom pay these men to attend a graduate school, and too often in the undergraduate school, they get a course that is neither well suited to their immediate needs, nor satisfactory from the standpoint of the higher preparation. What is needed now in Forest education is a greater number of first-class schools for the education of rangers and woodsmen. Meanwhile the enormous field of popular education in forestry is either completely neglected or carried on in a desultory way by State or experiment station officials.

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RECENT FOREST SERVICE PUBLICATIONS

Value of Windbreaks

Tree planting has lost favor with present day farmers in the Middle West whose crops have never experienced the damage from the great winds that once swept unimpeded across the plains, and against which the early settlers planted trees as a barrier. It is the idea of the younger farmers of to-day that all but the most productive tracts of timber should be done away with, and their places taken by crops which will bring quick money returns. The fault, however, lies as much with the owners of the timber as with the trees themselves, for, while much progress has been made toward improved and more intensive methods of crop management, little has been done to increase the productiveness of the grove or belt of trees. The great need is for better management. In addition, care has not been given to forest plantations, and as a result, the revenue from them is only a fraction of what it should be. When the productive value of windbreaks is rightly considered, there will be in the benefit to crops, and in other helpful influences of the belt of trees, an annual income of considerable magnitude in addition to the value of thinnings, which, in certain regions, will bring the productiveness of the forest up to that attained by field crops. Forest Service Bulletin 86, Windbreaks, presents a very thorough study of the problem. The effects of windbreaks, both good and bad, upon nearby crops are gone into minutely, the possible timber yield from plantations is estimated, the species best adapted for windbreak planting are discussed, and suggestions given for the most efficient windbreaks for various regions.

Forest Service Bulletin 86. Windbreaks: Their Influence and Value, by Carlos B. Bates, Forest Assistant. Washington, 191. Pp. 100; plates 20; diagrams 35.

The Substitution of Colombian Mahogany for True Mahogany

That Colombian mahogany, *Cariniana pyriformis*, is being widely substituted for true mahogany, *Swietenia mahagoni*, is the assertion made in Forest Service Circular 185, Colombian Mahogany: Its Characteristics and Use as a Substitute for True Mahogany. The great popularity of true mahogany as a furniture and finishing wood has caused a steady depletion in the available supply ever since its earliest use in about 1724. To-day, though the consumption of material passing in the markets as mahogany amounts annually to about 40,000,000 feet, the cut of real mahogany is only about 18,000,000. Colombian mahogany, which is the wood most often substituted for true mahogany, although it differs widely from the latter, in its botanical and anatomical characteristics, bears a close superficial resemblance to it, and its physical properties at once distinguish it as a high class cabinet wood. There is no reason, in fact, why Colombian mahogany should not be employed for all purposes for which true mahogany is used. There should be no objection to calling such a wood by its proper name. The wood is hard, heavy, strong, and tough, and in color and weight compares almost exactly with the genuine mahogany. Those who work Colombian mahogany wood observe that it dulls the saws and other tools very quickly, a fact which first cast suspicion

on it as not being real mahogany. It comes entirely from Colombia, and is cut at points from 100 to 200 miles inland, and is shipped from Cartagena.

Forest Service Circular 185, "Colombian Mahogany (*Cariniana pyriformis*): Its Characteristics and Its Use as a Substitute for True Mahogany (*Swietenia mahagoni*), by George B. Sudworth, Dendrologist, and Clayton D. Mell, Assistant Dendrologist, Forest Service, with a description of the botanical characters of *Cariniana pyriformis*, by Henry Pitteir, Bureau of Plant Industry. Washington, 1911. Pp. 16; Figures 11.

Over-Grazing Brings Floods

The harmful effect upon streamflow through denudation of the watersheds by over-grazing is illustrated graphically in Forest Service Bulletin 91, *Grazing and Floods*. That portion of the Wasatch Mountains embraced in the Manti National Forest in central Utah has for a number of years been subject to severe floods after all storms of more than usual violence, with corresponding scarcity of water during periods of drought. With the creation of the Manti National Forest in 1903, all grazing was prohibited on the uplands of Manti Canyon. From then until 1909 the area was protected from stock. In the latter year some 300 head of horses were allowed in the closed area. The exclusion of all stock from the protected area for five years gave the uplands a chance to become well clothed with vegetation before the flood season of 1909. The beneficial effects obtained from the protection of Manti Canyon were forcibly shown in 1909, when Ephriam and Six Mile Canyons were flooded severely, while Manti Canyon lying between them was not perceptibly effected. Both Ephriam and Six Mile Canyons were heavily over-grazed by sheep from 1882 until the establishment of the Forest in 1903, and have since then been closely grazed by cattle. Accordingly, at present there is a much better soil cover in Manti Canyon, and there seems to be no reasonable doubt that to this fact it owes its escape from the floods of August 17 and 31. Additional evidence of this is furnished by

the striking fact that although in the unprotected canyons floods occurred in 1906, 1908, 1909, and 1910, the last serious flood in Manti Canyon occurred in August, 1902, before any effort was made to protect it from over-grazing.

Forest Service Bulletin 91—*Grazing and Floods: A Study of Conditions in the Manti National Forest, Utah*, by Robert V. R. Reynolds, Forest Examiner. Washington, 1911. Pp. 16; map; plates 5.

History of the Pines

The uses of the many different species of pine and their histories are described in Forest Service Bulletin 99, *Uses of Commercial Woods of the United States: II Pines*. Thirty-seven species of pine grow in the United States, not any one in all the states, yet perhaps with one exception no state is without one or more. About 48 per cent of the total output of lumber in the United States in 1908 was pine. Longleaf probably furnished more than any other single species, and white pine was next. The western yellow pine, which is more widely distributed than any other pine in this country, is a large producer of lumber, and the western white pine and loblolly also rank high in quantity. The bulletin considers each species separately, taking up even little-known ones. The great variety of uses to which longleaf, shortleaf, loblolly, and Cuban, all grouped in the market under the common name of yellow pine, are put, is given in detail, and under the chapter on white pine an interesting account is given of the great lumbering operations in New England and the Lake states, now things of the past. Norway, jack, western white, western yellow, sugar, and loblolly pine all receive their due share of attention, and even the lesser known species, such as Chihuahua, pine, Apache pine, Mexican white pine, and single leaf pinon are taken up in turn.

Forest Service Bulletin 99—*Uses of the Commercial Woods of the United States: II Pines*, by William L. Hall, Assistant Forester, and Hugh Maxwell, Expert. Washington, 1911. Pp. 96.

President A. L. Flewelling, of the Western Forestry Association, says: "Each year fire fighting and fire prevention is becoming more and more a science. America leads in the forestry question from every angle, and I think I am safe in saying that large forest fires, especially in the Northwest, are a thing of the past."

STATE WORK

Fire Protection

Fire Warden Howell Thomas of Appleton, Wis., who is stationed at Crystal Falls, Mich., and has under his supervision about one-half of Iron County, comprising some half million acres, tells of what is being accomplished in preventing forest fires in his district. The work is being done by the Northern Forest Protective Association.

About 2,000,000 acres of forest and are represented in the membership of the association, the fire wardens or rangers receiving their compensation from a fund created by an assessment of $\frac{1}{2}$ cent per acre, which means about \$50,000 per year. While the fire wardens devoted the greater portion of their time to preventing fires and patrolling their districts, says Warden Thomas, they also did considerable educational work, instructing people residing in their respective districts as to the safest methods of disposing of their huge brush piles and as to building campfires. In many ways, says Warden Thomas, the fire wardens averted damaging conflagrations by a timely warning to woods people, who receive the rangers very kindly. The term fire wardens is used in place of forest rangers, by reason of the fact that they have power to make arrests and to demand assistance whenever occasion demands.

As this is the first year of the association the wardens have had considerable hardship, being obliged to make their patrol on foot. The leaders in the association, which comprises large lumber interests, however, propose to equip the wardens with horses and other equipment next year. Warden Thomas told of taking a fifty-mile trip with a fifty-pound pack on his back in order to cover his patrol and he says it was no simple task to accomplish it. The association further proposes to erect look-out or watch towers on the higher points of land in the respective districts, which will greatly enhance the efficiency of the patrols, and this will mean that the wardens will be employed throughout the entire year and not only during the season when fires threaten millions and millions of feet of timber.

In addition to keeping close watch on the interests of the land owners in the association the fire wardens fight fires on the property of others in order to prevent its spreading to property they are sworn to protect. Coupled with fire fighting is the duty of the

wardens to arrest land grabbers and in every way possible make it a point to see that nothing irregular takes place by way of transfers in lands and timber holdings. It will not be long, says Warden Thomas, when the protective association will have extended its lines into Wisconsin and Minnesota, if present plans of the organization do not miscarry, as things point most favorably in that direction at the present time.

Enforcing the Law

The New Jersey State Forestry Commission, of which Governor Wilson is the president, is strictly enforcing the forest fire service law, as this letter, sent to the Wantage township committee attests:

GENTLEMEN: The Forest Commission has decided that a forest fire service must be maintained in Wantage township. You are accordingly notified that unless a township fire warden who shall be satisfactory to the Forest Commission is appointed to serve for the year beginning January 1, 1912, and the necessary appropriation made for his salary and possible expenses, the Forest Commission will appoint a state fire warden to be fire warden of Wantage township as it is authorized to do by Section 2, Chapter 123, Laws of 1906.

You are reminded that the effect of such an appointment will be that no resident of Wantage township can burn brush, or make any fire in proximity to a forest, as provided by Section 9 of the Forest Fire Law without a permit from the state fire warden who may be serving as township fire warden. It is understood that this requirement will impose some inconvenience and possibly hardship upon residents of the township, but since you as representatives of the people have seen fit to ignore the requirement of the Forest Commission to provide a township forest fire service it is obliged to uphold the law even if the means involve inconvenience. And you may be assured that if the Forest Commission is obliged to resort to this course it will also enforce the law against all offenders.

The action indicated will be taken with great reluctance, and it is hoped that it may be avoided. The matter is therefore brought to your attention thus early that you may take the necessary steps to secure the needful appropriation for next year.

Idaho Experimental Stations

In order to become more familiar with the growth and reproducing of white pine timber, the bureau of forestry has established an experiment station in the Kaniksu National forest, Idaho. The station is located at the Benton ranger station and consists of a large building to be used for experimental work, a well-equipped laboratory, a greenhouse and a residence for the supervisor in charge. The station has been constructed under the supervision of R. Zuni of the bureau of civics, with headquarters at Washington, D. C.

The station will be under the direction of Donald R. Brewster, formerly of the Bear-tooth and St. Joe National forests and one of the best-known men in forest work in the northwest.

It is the idea of the department to become more familiar with the planting, growing and reproducing of white pine timber characteristic of this section. During the last few years the national forests of the west have to some extent been burned over, and it is the intention of the department to replant many acres of the burned-over areas, if experiments prove practicable. For this purpose they have already collected many thousands of bushels of white pine cones, which will be used in reseeding. Over 30,000 bushels will be collected this year to be used next season.

The station will also be used by the department of plant biology to determine causes and remedies for diseases that infest the forest trees in this and other localities. That the station is a permanent structure is evidenced by the stability of the structures. If this new venture is a success other experiment stations will be constructed in the west.

Encouraging Tree Planting

Very few Dutchess County, N. Y., land owners have taken advantage of the offer of the state of New York to supply young forest trees at a cost of only \$4 per thousand, says the Poughkeepsie, N. Y., News-Press. The state is very anxious to induce owners of untillable soil to plant these trees, which consist largely of varieties of the pine family.

George H. Sherman, cashier of the Farmer's and Manufacturer's Bank, whose country place is on the South Road, has set out several hundred of these trees, obtained from the state's nurseries in the northern part of the state. They all seem to thrive. The specimens are larch, spruce, fir and long leaf pine. In his pretty bungalow estate, Mr. Sherman will soon have these young forest specimens ready to take their places in the extension of his present grove, and in replacing any old trees that die or fall in storms.

The state has 11,000,000 trees to send out. The question of using prisoners in the work of reforestation is agitating many

countries. The government of New Zealand has tried it with success. About 1,100 prisoners have been taken to camps up in the wilderness, staying for a few weeks at a time, and in course of the work 22,000,000 young trees have been planted.

A Big Project

New Jersey State Forester Gaskill in speaking of the agreement he has concluded with former United States Senator John F. Dryden, and A. R. Kuser, for the development of the forests which they have recently acquired on the Kittatinny Mountain where no less than 100,000 evergreen trees will be planted next spring, says further planting will require at least 500,000 trees. Mr. Gaskill says:—

"Along with the planting, active work in the existing forests will be undertaken, chiefly by means of improvement fellings through which the worthless material now standing and some that is mature will be removed and opportunity given for the establishment of an economic forest. Other plans already under way include the making of a deer park of about 3,000 acres and the construction of a complete road system by which access will be given to every part of the property both for pleasure and for the removal of forest products. The roads will also be laid out with a view to affording security against forest fires and a complete fire protective system will be organized.

"Mr. Dryden's and Mr. Kuser's object in acquiring this property and undertaking to develop it is only partly to maintain an estate for their own pleasure, or to watch a forest grow. They have in mind the redemption of a considerable tract of wild land from the neglect and abuse into which it has fallen and believe that their venture will prove a good investment.

"The state forester, on behalf of the Forest Commission, welcomes this opportunity to bring so large an area of woodland under practical management. It is one more proof that the policy of the commission is a reasonable one; that is, if individuals can be encouraged to handle their woodland under the direction of foresters there will be no need to acquire a large state forest. The state will need more forests than it now owns, but in general the public possessions can be restricted to tracts having peculiar value as demonstration forests, for water control, etc. Thus, the greatest possible good to the whole community may be attained. In other words, right management of forest lands is the thing we strive for, state ownership is only a means, and unless State ownership leads to better management than private ownership there is no advantage in it.

"So far as the public is concerned, it is announced that while hunting will be entirely prohibited on these properties and mischief of all kinds controlled, all orderly people will have as free use of them in every other manner as heretofore."

NEW AND NOTES

Lecture by Governor Bass

Governor Robert P. Bass, of New Hampshire, the President of the American Forestry Association, gave a lecture on "The Conservation of Our National Resources" at Clinton, Mass., on November 3. The Clinton Courant says: "The subject as dealt with by Governor Bass was very interesting in an instructive way. In his opening remarks he stated that the subject was large enough for a whole series of lectures and only a few of the more important points could be touched upon in an evening. The speaker said if he was to talk politics he could no doubt make the subject more interesting, but he was not present for that purpose.

"He said that no public question of today is more fundamental than that of conservation. In 1908 the first governor's conference was held at Washington and as a result, a national conservation committee was chosen to have charge of the work. He then defined the meaning of conservation, which he said is an endeavor to preserve for future generations natural resources that are being rapidly used. Conservation is practiced by the federal state governments as well as by the people in general. Governor Bass divided the subject into four parts as of the most importance, these being: Forest, water-power, agriculture and minerals. In the latter are included the coal, gas and phosphates which are found in the West and South. He said the government must retain the title to those lands where the minerals abound in order to protect itself. He explained that these lands are leased to parties with a restriction on the amount which can be mined. There is also a provision in the lease which compels the lessee to operate the land for a certain length of time.

"Governor Bass touched on the Cunningham claims in Alaska, which were won by the government. In these claims are the two greatest coal fields in Alaska, and last spring a portion of them was claimed by a man in that section. The matter was investigated by the Secretary of the Interior and it was found that the claim was all right. Conservation is endorsed by the great monied interests all over the country.

"In regard to agriculture the speaker said that our method of carrying on the work is very extravagant, and he told of the difference in the amount of the crops raised in this country and those produced in Germany

and England. The loss to crops because of insect pests in a year is \$659,000,000. Special trains are sent about the country explaining the better ways of raising crops. This department is doing as much as any other department in the national government in the way of decreasing the high cost of living, he said. In regard to irrigation he said that congress appropriates a large sum of money each year for this work. In 1909, thirteen of the states in the union had systems of irrigation. These lands which are nothing more than deserts, are taken up by the government and irrigated and they are then sold and the money which is derived, is used in irrigating more land. These lands after they are once irrigated, produce some of the best crops in the country.

"Forestry was another subject which Governor Bass spoke on. He said that of the 550,000,000 acres of forests in the country, about 150,000,000 are in national reservations. The decrease in the forests each year is three times the increase, not counting the loss from fire. The forests produce twelve cubic feet of timber per acre each year, while the consumption is about forty cubic feet. In France the growth in timber land is the best in the world and the production there is fifty-three cubic feet per acre each year. The average yield from the forests per acre in Saxony is from \$4 to \$40, while in this country the yield is about $\frac{7}{8}$ of 1 mill per acre. In Germany \$3 is spent on each acre of land, while \$1 is spent here. He told of the importance of the rivers for water-power, and he said more and more each year the value of the water for power is being shown. He told of the Weeks bill which had been passed, with an appropriation of \$2,000,000 annually for irrigation."

Excellent Fire Control

W. I. Pack, supervisor of the Uinta forest, with headquarters at Provo, reports another fire season closed with a clean record for the patrol force, not a single fire having gotten beyond control this year, says the Salt Lake *Herald Republican*. Before this forest was proclaimed by President Roosevelt, fires in that region were frequent, often burning for weeks uncontrolled.

The rapid work and constant vigilance to make this record is shown by the fires discovered and put out during the past summer.

In the early part of August in the after-

noon, a ranger patrolling along the "Divide trail" discovered a fire, gave the alarm, set out himself at once to fight it, picking up all the help he could on the way. He arrived at the fire in the evening with four sheepherders and started to work at once.

The same evening at 8 o'clock another ranger thirty miles away received warning of this fire, saddled up and started to assist in fighting it, picking up four or five men on the way. He arrived there at 2 o'clock in the morning and began work.

A third ranger, at Heber, received instructions at 10 o'clock that same evening, picked up a small force and was ready to start in a short time. On account of the long distance, hard night riding, his party was delayed from reaching the scene until 8 o'clock the next morning.

With this extra help the fire was put under control before it gained much headway. The fire did little damage, but it was burning directly towards a large body of timber. Without quick action on the part of the ranger who discovered it and the help given by his brother officers, a great loss might have easily resulted.

Another fire was handled much in the same manner. The ranger patrolling on the "Divide trail" discovered it, rode at once to the telephone station nearby, informed the supervisor at Provo and went back to the fire at once. He picked up several men at the reclamation service camp, some campers and sheepherders and started in fighting.

Another ranger twenty-five miles distant was instructed to get all the assistance possible and ride to the fire. Not knowing how many men would be needed he telephoned to Spanish Fork to the president of the Stock Growers' Association, telling him of the fire on the forest and asking him to get together as large a force as he could, but not to send them until further instructions. In a short time a force of 100 men equipped with saddle horses and fire fighting tools was ready to start.

As it happened, this fire was under control and this extra force was not needed, but should the fire have developed as was first expected, 100 men would have been at it and would have crushed it out before covering a large area and doing much damage. The fire was discovered at 2 o'clock in the afternoon and in two hours was under control and entirely out before dark of the same day.

Late in August another fire was discovered near the forest nursery on Beaver Creek. The same quick, decisive action was taken and in a few hours a force of thirteen men and a complete fire-fighting outfit with supplies sufficient for three days was gotten together at Kamas.

They arrived at the fire at 7 o'clock in the evening and went to work immediately without waiting for anything to eat. By 2 o'clock in the morning the fire was completely trenched around and fairly well under con-

trol. The force stopped for a delayed supper and a short rest, returning to work at 4 o'clock. By 10 o'clock the same morning the fire was under control. This fire was burning directly toward a body of fine merchantable timber amounting to 30,000,000 feet and worth probably \$90,000.

The forest area embraced by the Uinta national forest, comprising over 1,285,000 acres, is on the west extension of the high and rugged Uinta range, and on the Wasatch range. It protects the heads of many streams important in irrigation and as a source of water supply for hydro-electric power plants. The main streams are, Duchesne, Strawberry River, Bear River, Weber River, Provo River, Black's Fork of Green River and Rock Creek. Important power projects are already in operation on the Provo, Bear and Weber rivers, and more are contemplated.

All these streams will ultimately be reserved to their utmost capacity for both power and irrigation purposes. The necessity, not now appreciated, of a complete and efficient forest-cover with the soil conditions which it carries, will then be beyond question. Fire is the most destructive agent of such cover.

The full force of the damage of many extensive old burned tracts is obscured by the subsequent shrubby growth. Quite a stretch of the imagination is required to picture fire denuded watersheds with their original dense forest cover.

Another important feature of a forest, although it does not figure directly as a money value, is the scenic effect. There are many beautiful lakes at the heads of the stream, particularly the Provo River. These spots are ideal camping resorts whose attractiveness and beauty would be destroyed by fire.

European Conservation

Captain John B. White, of Kansas City, who has been touring Europe investigating the practice of forestry and conservation for the United States Conservation Commission, said in a recent interview:—

"The United States has much to learn from Europe regarding the conservation of natural resources. We shall recommend the adoption of the methods of the nature of those which have been in successful operation here for many years. The taxation of American forests is a hardship which discourages the planting and cultivation of trees, and with its abolishment a long step forward would be taken.

"In Austria a landowner is relieved of taxation for twenty years, provided he grows trees on his property. The tax is imposed only when he starts cutting and begins to receive a return on his investment, and even that it is only nominal. In Switzerland, forests whatever their age, are always exempt from taxation.

"We need relief and encouragement of this character in the United States. Our con-

tention is that, when only one crop of timber is produced in a generation, it is unfair and unwise to levy a tax annually, for thirty or forty years, on timberlands. We believe timber should be treated like corn or wheat or any other crop—that it should be free from any taxation until it is cut.”

“The subject of forestry preservation should be removed entirely from the sphere of politics.” “The United States should handle it as a business proposition, as is done in France, Germany and most of the other European countries. In Germany the first demand made upon the forests is for firewood. The nation has found that it is cheaper to import timber for telegraph and telephone posts from Russia than to chop down its own trees by wholesale.

“The Siwald forest in Switzerland has been cultivated for more than 1,000 years. The city of Zurich owns it and operates a sawmill. The municipality’s profit, over and above the expenses of maintenance and replanting, is \$25,000 a year.

“Not only should the United States encourage forestry and development by removing the taxation from virgin forest lands, but it should adopt more stringent measures for the protection of its forests against fire. In Washington, Oregon and other pine-producing states in America probably as much timber has been burned as has been cut. We have seen afforded an object lesson in our travels about Europe.”

Municipal Forestry

Former Vice-President Charles W. Fairbanks, in an address at Lebanon, Ind., a few days ago advocated municipal forests. Places the size of Lebanon, he said, should establish municipal forests, whether by bequest or by drawing on the treasury of the municipality for the money.

Every town should have two hundred acres of land adjacent, which should be given to tree culture, he said. The devastation of the forests of to-day was deplored by Mr. Fairbanks. He cited the progress of Japan in attempting the preservation of the small forests in that country, and the work of conservation being carried on on a larger scale in China and Germany. Mr. Fairbanks made a stirring appeal that the boys and girls of to-day be enlisted in the effort for forest conservation. He recommended that trees be planted about the schoolhouses, the churches, hospitals and the home. The value of the municipal forests was said to be shared by the poorer class of people, who could not afford to pay exorbitant prices for wood in the winter season. With the city provided with the municipal forests poor persons should be allowed to draw on the municipal forests. Many persons, the speaker said, would be willing to give a tract of land for forest conservation.

Mr. Fairbanks closed with an appeal that the forestry movement have its sanction in the public schools, and that the children of to-day be instructed to conserve the re-

sources of nature, and not to impoverish the land adapted for tree preservation.

A despatch from Nevada City dated October 20, tells of able work in quenching forest fires started by incendiaries. It says: Supervisor R. L. P. Bigelow, of the Tahoe national forest, received a telephone message from North Bloomfield this morning to the effect that the two forest fires, which were set yesterday on Humbug Creek, below Lake City and North Bloomfield, were under control. The fire-fighters battled with the flames all night, finally conquering them.

The men worked under the direction of Forest Rangers W. A. Merrill, of North Bloomfield, W. H. Helbig, of Graniteville, and A. R. Ivey, of Nevada City, and crews were sent from Landsburg’s sawmill, North Bloomfield and Nevada City. Twelve men left this city yesterday evening and all of them were strong, able-bodied willing workers, carefully selected by Supervisor Bigelow.

Prompt action was necessary, as the fires were close to North Bloomfield and Lake City, and burned fiercely at times. The damage will not be heavy, but there was danger of those places being wiped out by the flames.

The people of North Bloomfield state that the fires were deliberately set by some unprincipled person, but for what reason they are unable to account. Had it not been for prompt action Bloomfield would undoubtedly have been destroyed.

At a recent convention of the New York State Waterways Association in Buffalo, Charles H. Jackson, of Albany, deputy state conservation commissioner, said the state led the world in planting trees and in seeking to renew growth along river banks.

“New York is doing twice as much as the rest of the United States in seeking to replant her forests,” said Mr. Jackson. “By using prison labor the state is enabled to raise trees at a minimum cost and thus supply the public much cheaper than nurserymen.” The speaker urged everyone interested in water power development to encourage the planting of trees.

At a banquet in Boston on November 9 Congressman Weeks, in a speech dealing with his bill for forest preservation, declared that last year’s revenue from forest lands in the Rocky Mountain district was \$1,000,000 in grazing and from \$4,000,000 to \$5,000,000 in forestry. He prophesied that in the near future these revenues would pay the expenses of the forestry bureau of the Department of Agriculture.

A Correction.

In the article on “A Fire Protection Plan in the Southern Appalachians,” published in the November number of AMERICAN FORESTRY, it was stated by W. H. Weber, the writer, that the Cherry River Boom and Lumber Company is the owner of some 250,000 acres of timberland in West Virginia. By a typographical error this appeared in the article, as printed, as 50,000 acres.

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